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THE COMMERCIAL CAR JOURNAL

PUBLISHED THE 15TH OF EACH MONTH

CHILTON COMPANY

MARKET & 49TH STS. PHILADELPHIA

HIGH SPEED NON-GRAN BEARING BRONZE

"The High Price Bronze that Saves Repairs"

The Bearings of your Trucks are small parts, but they are probably the most vital in determining the Truck's efficiency and its ability to give you constant service.

THE BALDWIN LOCOMOTIVE WORKS in replacing the wornout bearings in their entire fleet of Swiss "Saurer" Motor Trucks used NON-GRAN *exclusively.* They have to foot the up-keep bills on these Trucks and, more important still, they have to keep the Trucks on the road day and night every day of the year. They chose NON-GRAN in spite of the fact that its first cost is about twice that of any other bearing bronze made.

¶ NON-GRAN High Speed Bearing Bronze differs radically from any other bronze made. Because of its dense structure and extraordinary cohesive toughness, NON-GRAN will not—it cannot—granulate. No amount of frictional stress can separate its component parts. That is why Bearings of NON-GRAN retain their original surface polish throughout their entire life. NON-GRAN will resist and withstand impact and pressures that would put any other bearing bronze out of commission, and will not weaken or depreciate under any condition of service.

¶ The open, loose-knit structure of ordinary bearing bronzes is responsible for countless automobile troubles and for heavy repair and renewal expenses. Flaking off is a characteristic weakness of most commercial bronzes. This in itself should be enough to prohibit their use on motor cars. Any bronze that flakes or granulates soon saturates the lubricating oil with minute metallic particles, causing undue wear, not only to the part itself, but to all other parts of the motor reached by the metallized oil. One need not be a mechanical engineer to appreciate the harmful effect this oil is having on every working part of the motor.

¶ If you are a Motor Truck Manufacturer or a Motor Truck User, we shall be very glad to hear from you and give you particulars in full about NON-GRAN High Speed Bearing Bronze which is now being so largely and so successfully used.

¶ NON-GRAN is built for ultimate economy,—*not* to meet a selling price. Write us now asking for full particulars.

AMERICAN BRONZE COMPANY

BERWYN, PA., U. S. A.

THE PUBLISHERS' PERSONAL PAGE

By C. A. MUSSELMAN

It Is Imperative

That you investigate the use of the latest method of transportation,—the commercial car. The uses which are being found for these modern vehicles are almost unlimited, their field of usefulness is widening every day. If you intend to stay in business you cannot, must not, neglect this important subject. Your competitor has already installed commercial cars and you must soon follow or be left in the race. Study the COMMERCIAL CAR JOURNAL and be up to date.

The COMMERCIAL CAR JOURNAL has information of value to the owner, the user, the driver, the salesman, the manufacturer and the engineer. Topics of live interest are discussed in each issue. This number will be found helpful and instructive. It has many articles of vital moment to you.

Special Articles

There are several special articles in this issue which will be found interesting to the student of transportation engineering. Among these may be mentioned "Motor Trucks in Brewers' Service," by Charles B. Hayward, a well-known writer, and one who knows whereof he speaks. Some interesting facts are given, backed up by figures. "Prompt Delivery as Influenced by the Specialist: An Illustration of Utility," is the title of an article by Mr. William J. Johnson, our Western Editorial Representative. Under this title he ably handles the subject of influence of the motor car on the most vital problem of the business man of to-day, that of prompt delivery. Many interesting and specific cases are mentioned, and the article is well illustrated. "Horse-Drawn vs. Motor-Drawn Freight" is the subject of another article of unusual interest. "Some Possibilities of Inter-City Communication—What can be Accomplished:" This is the special topic taken up in the second installment of Mr. Johnson's article on "The Commercial Car for Long Hauls."

The latest motor-driven horse ambulance is also illustrated and described.

New Commercial Cars

Some of the late models of commercial cars are described and illustrated in detail. Among these may be mentioned The McIntyre Commercial Cars, by William J. Johnson; The Rapid One and Two-Ton Truck, by D. E. Scriber; The Rovan Front-Wheel Drive and Steer Worm-Driven Front Axle Truck, by D. E. Scriber; and in the Electrical Department are described in detail the Waverley Electric Commercial Cars.

Our Foreign Department

In an article entitled, "The Motor Cab," our Foreign Correspondent puts us in close touch with conditions as they exist abroad. Mr. Frank Palmer gives a concise, technical description, well illustrated, of a leading British truck—The Halley.

The Worm Gear

A comprehensive paper on the subject of "The Worm Gear as Applying to Motor-Driven Vehicles," by E. R. Whitney, was recently read before the Society of Automobile Engineers, at Dayton, Ohio. Vital parts of this paper are herewith reproduced and a very clever summing up of the worm-gear situation is included in table form.

In the World of the Electrics

In the Electrical Department is a brief review of the last meeting of the Electric Vehicle Association of America; an article by Albert Weatherby, "Electric Auto Growing in Favor," and the description, before mentioned, of the Waverley Electric Commercial Cars.

Editorials

The subject of whether the rubber tire will be displaced, is discussed editorially, and also the question of whether the governor should be operated at the car or the engine speed; and a suggestion is herewith made by Mr. E. S. Foljambe, our Managing Editor, that a combination of the present methods of governor driving could be employed to advantage.

Regular Departments

There is much to attract the reader in our regular departments, under the headings "Instructive Experiences," "News of the Dealers and Garages," Criticisms and Suggestions," etc.

The Commercial Car Journal

VOLUME I. PHILADELPHIA, JULY 15, 1911 NUMBER 5

The National Efficiency and Economy Competition
Will Promote the Habit of Keeping Detail Records of Cost and Performance

INCE the announcement of the National Efficiency and Economy Competition for commercial car owners, the one fact which stands out most prominently in our correspondence and conversations with commercial car owners, is that almost without exception, no record whatever is kept of expenses, or of distance covered, or work done.

While many of our correspondents appreciate the value which such data would be to them, and express their intention to get to it as soon as possible, they keep putting off the day of starting, and in the most cases forget entirely to start.

The manufacturers of commercial cars, appreciating the value to them of authentic records of cost of upkeep and service performed by their cars in the hands of various classes of owners, have urged all buyers of their cars to keep detailed records, and in a few cases have gone as far as to provide blanks for the purpose of keeping records.

But notwithstanding all this urging and agitation, it is safe to say that 90 per cent. of commercial car owners keep no records of any kind.

Value of Records

Why should records be kept? Some new commercial car users apparently do not realize the reason and importance for keeping such records. Those who have had cars in service for some time, know full well that accurate records are the surest means of knowing whether they are receiving the service which they should from their cars. These records show conclusively what work is being done as compared to former methods and give the data necessary for determining the type, sizes and number of machines which are required to obtain economical service. Such records show conclusively which drivers are abusing their machines and which ones are getting efficient service out of them. They show whether parts which mysteriously give way have run sufficient distance to warrant such a failure. The mileage of each of the tires is, of course, determined and adjustments and credit can be obtained from the tire makers in cases where the owner knows that tires have not gone the distance which they should reasonably be expected to give. But above all, those connected with the care and operation of these vehicles are impressed with the fact that results must be shown, and that by their care or neglect, results can be had or lost, and furthermore that the blame can be accurately placed. It is by such painstaking, careful and consistent methods, and by such methods alone, that the best work can be had from a fleet of commercial cars.

Reasons for the Competition

It was mainly for the purpose of assisting in the matter of keeping records, that the "National Efficiency and Economy Competition" was conceived, and those concerns who have entered their cars in this competition, through having used the blanks provided for the daily reports of the driver and the weekly summary, during the six months covered by the competition, will not only have valuable data for their future guidance, but will have formed the habit of keeping records and can very easily continue to do so, either in the same form or some similar form suitable to their individual case.

Force of Habit

There is no doubt but that the underlying cause of the failure of car owners to keep records, is that they previously used horse-drawn vehicles, the cost and performances of which were so well known that only general expense accounts of horse-drawn service were kept, and as it is a human failing to be ruled by habit, it is very difficult to bring about the desired change from general records which only show costs in a lump sum, to detail records which show costs in detail and also the actual performance, or work done by each vehicle.

Enter Anyway

Every commercial car owner should enter into this competition, whether he thinks he has a chance of winning or not, because it will be a practical help towards forming new habits in the manner of keeping records, more in line with the requirements of commercial motor cars.

The merchants or manufacturers who have adopted commercial motor cars in their regular service do not contemplate going back to horses. Why not then keep records which will in a few years be a guide to greater economy and efficiency?

We hope that this will be read by every commercial car owner who has not already entered this contest, and that they will see the point we have endeavored to make here, that they should enter for the purpose of acquiring the habit of keeping detail records, whether they believe that their car will win or not. In fact, there is more reason for them to enter if they are doubtful of winning, for if they lack confidence in their cars, the competition will either convince them that it is all right, or give them the information to make it right.

METROPOLITAN SECTION OF S. A. E. DISCUSSES COMMERCIAL SUBJECTS

At the last meeting of the Metropolitan Section of the Society of Automobile Engineers, June 29, the governing committee announced the election of 68 new members to the local branch. The principal topic of discussion was costs systems for commercial vehicles. The establishing of a systematic and uniform accounts system was strongly urged and it was shown that the methods of keeping accounts, especially of the various taxicab companies, are so varied that they cannot be compared effectively. It was suggested that a committee might formulate some uniform plan for adoption. It was stated that there are four main divisions of accounting: First, interest on investment, depreciation, etc.; second, upkeep, including cost of tires, fuel and lubricating oils; third, garage expense, including labor, and, fourth, the chauffeur labor account. Interest and depreciation of buildings, office equipment, garage equipment, etc., can easily be agreed upon, but very few have a rational appreciation of what should be embraced under the heading depreciation. The logical way is to separate the working from the non-working elements and consider bearings, tires, etc., as material used up in work. Although ten years is a long enough period so that equipment might become obsolete, yet this period is not too long to assume as a working period. This has already been demonstrated by many electrical vehicles in New York City. It was suggested that an S. A. E. committee be appointed to try to determine upon a standard accounting system. Taxicab operation in New York City is conspicuous for the large amount of dead mileage, this being estimated as high as 85 per cent., as against 50 per cent. in London, while the New York tariffs are about as three to one, to those of London.

Devices for recording the starts, length of stops and traveling speed of commercial motor vehicles were also discussed at some length.

NEW MAINE AUTO LAW

The new law in regard to the registration of automobiles in the State of Maine which becomes effective on December 31st, 1911, provides that motor trucks, traction engines, log haulers, or automobiles used for commercial purposes shall pay a registration fee of $10. The law also provides for a fee of $25 for the privilege to purchase, demonstrate, sell and exchange commercial cars. The license fee for operating a motor truck or traction engine is placed at $2, and is issued to persons not less than 16 years of age.

BOSTON COMMERCIAL VEHICLE SHOW

The Boston Commercial Motor Vehicle A sociation has reconsidered its decision of not holding a show, and has decided on holding an exhibition from March 13th to 20th, in Mechanics Hall. The final vote was carried by a two-thirds majority of the members of the Association. The Association intends to hold a three-day demonstration next September, to be followed by a three-day open-air exhibition,

AMENDED INSURANCE REGULATIONS

New regulations governing the writing of insurance policies on commercial vehicles were agreed upon at a conference of insurance interests in New York, at which representatives of such companies as the Employers' Liability Assurance Corporation, the Travelers' Insurance Company, and the General Accident Insurance Company were present. The regulations are in substance, as follows:

Class 1. Baggage delivery, brewers, express companies, forwarders, ice dealers, local express, news companies, newspaper delivery, parcel delivery, transfer companies and truckmen. Local and suburban expresses operating between city territory and outside territory are written only at rate charged for city territory. Liability premium, $175. For the property damage clause, covering the assured to the amount of $1,000 for any injury to other people's property other than his own, the companies have since January 1 asked 40 per cent. of liability premium, or 40 per cent. of $175, for this protection. Heretofore it used to be ¼ of 1 per cent. of the liability premium.

Class 2. Ambulances, boilers, dry goods and department stores, furniture and piano dealers or movers, liquor dealers, mail wagons, safe movers, soda and mineral water manufacturing and distributing, premium, $150, and the property damage is the same, 40 per cent. of the $150.

Class 3. All other commercial automobiles not hereinbefore mentioned, premium $100 for liability and 40 per cent., or $40, for property damage.

Class 4. Automobiles of the private type used by salesmen, collectors, insurance agents, real estate agents, physicians, and automobiles used for other business purposes, excluding transportation of merchandise, must carry the ordinary private automobile rate for the district in which the automobile is owned. This figure is based on the exclusion of all passengers' hazards for which an extra charge of 40 per cent. must be made.

If a policy is used to cover an automobile classified under Class 4, commercial automobiles, and passenger hazard is not to be covered, said policy must be indorsed as follows: "In consideration of the reduced premium at which this policy is used, it is hereby understood and agreed that it does not cover claims arising from accidents to any person or persons while entering upon, riding in or upon, or alighting from the automobile described herein when such person or persons are to be, are being or have been carried for a consideration."

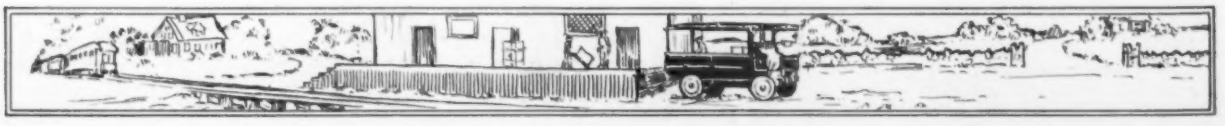
Automobiles of the private automobile type without any alteration in chassis or body from the private automobile type occasionally used for transportation of merchandise, may be written only at a premium of 1½ times the premium for the same car when used for pleasure purposes only.

Class 5. Motor cycles used for any commercial purpose, including the delivery of goods and merchandise. Liability premium is $40 and the property damage is 40 per cent. of this premium, making $16. Three-wheeled delivery motor cycles, sometimes known as "tricycles," and equipped with a body for delivery of merchandise, shall take the rate provided for automobiles used in the same kind of business.

The foregoing regulations are binding upon agents and brokers who write automobile insurance.

THE GOODRICH ROAD MARKERS

Another instance in which the Commercial car proved indispensable is in connection with the road marking campaign which is being carried on by the B. F. Goodrich Company, of Akron, Ohio. White gasoline trucks are being used to carry the 12 ft. posts, signs, spades and other necessary implements. The work was started April of last year, and the roads between Cleveland and Buffalo, New York and Albany, New York and Philadelphia, have been thoroughly posted. Long Island has been covered, and the Ideal Tour posted.



Horses Prostrated by Hot Wave

MANY DELIVERIES DELAYED

During the recent unprecedented heat wave of the first week of July which extended over the entire Atlantic seaboard and west to the plains States, heavy trucking was seriously interfered with by prostrations of the horses. This was particularly noticeable in large centers such as New York, Philadelphia, Boston, Cleveland, etc. In Philadelphia, the S. P. C. A. reported that they were unable to take care of the situation. Calls were received from all quarters of the city from ten o'clock in the morning until late in the afternoon, reporting horses prostrated. All the horse ambulance wagons were kept constantly busy, but in spite of this, many horses lay for two to three hours in the broiling sun before they could be attended to.

Ambulance about to remove a brewery wagon horse which was prostrated by the heat. This was a typical scene, more horses being down than the S. P. C. A. could care for. The delivery of goods was delayed and many valuable horses ruined. Moral: Use commercial cars.

General trucking horses and the brewers were most affected. Although some of the large brewers have their own ambulance wagons and had from two to four extra veterinaries at work, they could not cope with the large number prostrated. Some streets were blocked and cars stopped by horses which had fallen on the tracks and had to be dragged to one side while the loads of the wagons were transferred to automobile trucks or other vehicles. The accompanying illustration, a photograph by one of our staff, gives a typical scene. This shows a brewer's horse which lay in the sun for three hours before the ambulance arrived; the ambulance is shown just after its arrival on the scene.

In view of the fact that the present commercial motor cars have demonstrated beyond a doubt not only their efficiency, but their economy in the transportation and delivery of heavy merchandise, the loss and delays incident to delivery by the old horse method should be sufficient to open the eyes of more merchants, to say nothing of the situation from a humanitarian standpoint.

The Commercial Car in California

No Better Indication of the rapid growth of San Francisco territory as a market for high-grade commercial trucks can be shown than the fact that many branch distributing houses have been recently established there. The local demand for trucks is one of the largest in the country, and is attracting the manufacturers of motor trucks from all parts of the world. Wyckoff, Church and Partridge, manufacturers of Commer trucks, are the latest to invade the local field.

The motor truck is receiving much attention in the interior of California. Ranchers, dairymen, merchants and creamerymen are fast realizing that they can save considerable and secure more efficient service by the use of a light, powerful, but inexpensive commercial car. For instance, the Modesto, Cal., creamery has been using double teams to haul the cream from the different ranches; each team had a certain route, starting at 7 A. M. each day and returning with their load of twenty cans, weighing 100 lbs. gross apiece, about 4.30 P. M. In demonstrating the Buick truck, Frank Murray started at 8 A. M., went over the route, which was covered in places by 2 ft. of sand, collected the ton of cream and was back in the creamery at 12.30 P. M., a saving in time of over four hours. His full load weighed 2500 lbs., figuring in the men. The creamery management is enthusiastic over the work of the car, and intend shortly to replace all horse-drawn vehicles.

The Reo Truck continues in favor with the poultrymen of California; W. W. Freeman, of Fallon, owner of a 288 acre chicken ranch, has three 1500 lb. trucks in daily use. Mr. Freeman uses one truck to carry feed to the chickens, another to carry water, while the third is utilized in taking the product to town. He has found these three trucks more economical than the eight horses formerly used on the work. Norman De Vaux, local representative of the Reo Company, is at present devising a specially arranged truck, whereby Mr. Freeman can also collect his eggs in a motor. By an ingenious arrangement he hopes to nullify all possibilities of breakage.

Louis Nikrent, in a Buick delivery truck, carried 1100 lbs. of supplies to the summit of Mount Wilson, near Pasadena. As the road was narrow and steep, the grade being 18 degrees in many places, careful driving was necessary, but Mr. Nikrent made the ascent in remarkably quick time. This test proves that the motor truck is of practical value on the roughest California mountain roads.

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SHOULD THE GOVERNOR BE OPERATED AT CAR, OR ENGINE SPEED?

Many makers of commercial cars deem it expedient to equip their product with governors, usually of the simple flyball type, the action of which may be varied by spring setting. Regardless of construction, the same result is attained, checking the speed.

That the governor is essential goes without saying; that it can be tampered with is evident; but the driver who tampers with a governor is not the man to be at the wheel, for he is likely to take chances, to the detriment of the machine. He is the kind who will speed at all hazards, and speed is prohibitive, it is costly. Designers and builders realize that drivers of commercial cars have a penchant for speeding, just as much so as any red-blooded individual who climbs behind the wheel of a fast pleasure car, and a speed-checking device is the one thing that is going to make for longer and more satisfactory car service. That is why it is being fitted.

Common usage favors a checking device, the operation of which is determined by the speed of the motor. But, is such fair to the man at the wheel, or to the car itself? Let us assume that a three-ton commercial car has a full load aboard and is about to take a hill, a long, hard grade. In order to make it under the best of conditions the driver must speed up the engine, and what happens? Simply that the motor range determined by the governor has been reached and not sufficient power is being developed to carry the car up the hill. On the contrary, the engine may have been good for twenty-five per cent. more power than was available had the checking device been operated by other than the engine speed. This is one side of the question.

Suppose, on the other hand, that the same car was equipped with a governor operated at the speed of the vehicle. The driver could take the grade and have the full power of the engine at his command, as the governor would not work unless the speed of the car itself was greater than it should be.

With the governor operated at the speed of the car, the same desired result is attained as if it were cut in at engine speed and the full power of the motor is to be had, which is quite essential to satisfactory service.

On the other side of the question it may be said that the majority of engines do not show a torque curve which increases very much above 1200 to 1500 r.p.m., and that the governor can be set at this speed so that the driver will not race the engine. With such a setting practically the full power of the motor can be obtained, yet the motor cannot be injured. Where the governing device is operated entirely by car speed, it must, necessarily, be set at the maximum desirable speed on the high gear. This means that on low or intermediate speed the driver is allowed to race the engine as much as he pleases, as at even the highest engine speeds the car would not reach a road speed which would bring the governor into action.

It would seem that a combination of car-controlled and engine-controlled governor would be most desirable if such could be arranged. For instance, the governing device could be controlled by the car speed while in the high gear, a shift to any lower speed automatically connecting the governing device to the engine, so that on low speeds it would be controlled by the engine entirely.

It is evident that a speed-controlling device of some kind is necessary, and such a combination would practically do away with the defects of either the car-controlled or the engine-controlled governor.

WILL RUBBER TIRES BE DISPLACED?

About once a month the daily papers are prone to announce the advent of some wonderful substitute for the rubber tire, a device which will entirely revolutionize the automobile industry and do away with the necessity for using the costly pneumatic or solid rubber tire.

These announcements have been startling the public more or less regularly for the past six or eight years, and the patent office shows thousands of patents on devices for this purpose. Yet we are still using rubber on the rims of practically all wheels of automobiles, either pleasure or commercial. This of course does not prove that some spring suspension or pneumatic mounting of the frame and motor will not be invented which will do away with the necessity for using rubber tires, but all present indications point strongly to a continued use of this most peculiar substance, for many years to come.

If the claims made by certain inventors for their devices are closely analyzed it will be seen that even though their peculiar methods of spring mounting or their interposition of pneumatic cushions between the axles and the body were as perfect as they could be made, yet the action in either case would be entirely different to that of a pneumatic tire or even a solid rubber tire. Let us consider the case of commercial cars and solid tires especially, although it may be mentioned that pneumatics are now playing and will eventually play an important role even in the commercial car field. Let us assume that the spring device or pneumatic invention is so cheap of construction and so light in weight that it is not impracticable. Let us admit that its action is such that the jarring on the engine and body is so greatly reduced that the use of further cushioning effect is not absolutely necessary. Even under these most advantageous conditions such devices do not in our judgment do away with the necessity for the rubber tire. If rubber is not to be used on the rim of the wheels, what material is going to be used? Traction must be obtained by a commercial vehicle and heavy cleats or spikes will not be permitted on our city pavements on heavily loaded trucks. Of course there are wood blocks, malleable iron and steel and numerous combinations which have been tried with greater or less success, yet, when icy weather prevails, none of these are as satisfactory as the rubber tire.

If other than rubber tires are used, the question of noise must be considered, although very little has been done as yet on this side of the water in legislating against noise. This is a matter which has been taken up to a great extent abroad, and will in all probability be treated in the same way in this country. Nothing so deadens the sound of a heavily loaded vehicle as the rubber tire, and this is another reason why the use of rubber tires is likely to continue.

There is a peculiar action of the rubber tire which cannot be duplicated by any spring or pneumatic cushion placed either in the wheel hub, in the spokes, or between the axles and the body. We refer to the imbedding into the tire of small obstacles or, as it is sometimes spoken of, the swallowing up of small stones and obstructions by the tire. This action assists very materially in making the rubber tire the success it is. It deadens the blow or impact and the rubber seems to give back, due to its almost perfect elasticity, the energy consumed in displacing it. No other substance seems to have this property, combined with wearing qualities and other features which are necessary for a tire.

It is believed by some and hoped for by a great many, that some composition which is much less expensive than rubber will be invented which will serve as a substitute on the rims of vehicles. All kinds of combinations have been tried and fortune after fortune has been expended in a futile attempt to compound a substance which will possess these qualities.

We do not wish to discourage inventors or chemists, nor those who are working on this important subject, but we do wish to warn those who are spectulatively inclined, against too readily believing that this or that device will revolutionize the tire industry and do away with the long tried and apparently unreplaceable rubber tire.

STEEL TIRES FOR HEAVY COMMERCIAL TRUCKS

Some experimenting has been done in this country with steel tires, but the French mechanics have worked out this proposition much further and have substituted steel instead of aluminum for the bases of the engine and transmission cases. Also, by careful experimenting they have obtained a nice adjustment of springs, neither too hard nor too flexible, and have softened the greater vibration which the steel tire naturally gives to the machine.

These experiments, conducted over a period of four or five years, have been so successful that the French army, last Fall, passed an order requiring all their heavy five and seven-ton trucks to be equipped with steel tires. They issued this order only after a most thorough and exhaustive test on this style of construction.

For ordinary traction the steel wheel is as good, if not better, than the rubber, but where it is necessary, in especially bad and snowy weather, nonskidding tires can be slipped over the metal tires for temporary use, to be quickly removed when the exigencies of the case are passed.

The great width of the wheel necessary makes it also a great saver of macadam pavements, rolling down the roadbed instead of cutting it up as in the case with narrower tires.

When it is understood that with some manufacturers a guaranteed service of sixty thousand miles can be obtained from these steel tires as against a maximum of about five thousand on the rubber-tired vehicle, it can be readily seen what a vast saving this makes to the user.

With a heavy seven-ton vehicle it almost means a saving of the price of an additional machine.

At the end of this period, the four wheels may again be re-equipped for another term of sixty thousand miles at a total cost of two hundred dollars.

A speed of from ten to twelve miles an hour, it is claimed, can be safely obtained on steel tires. Such tires are now in use by the following well-known manufacturers: Aries, Berliet, Delahaye, Cohendet, Purry, Cazes and others.

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Suppose, on the other hand, that the same car was equipped with a governor operated at the speed of the vehicle. The driver could take the grade and have the full power of the engine at his command, as the governor would not work unless the speed of the car itself was greater than it should be.

With the governor operated at the speed of the car, the same desired result is attained as if it were cut in at engine speed and the full power of the motor is to be had, which is quite essential to satisfactory service.

On the other side of the question it may be said that the majority of engines do not show a torque curve which increases very much above 1200 to 1500 r.p.m., and that the governor can be set at this speed so that the driver will not race the engine. With such a setting practically the full power of the motor can be obtained, yet the motor cannot be injured. Where the governing device is operated entirely by car speed, it must, necessarily, be set at the maximum desirable speed on the high gear. This means that on low or intermediate speed the driver is allowed to race the engine as much as he pleases, as at even the highest engine speeds the car would not reach a road speed which would bring the governor into action.

It would seem that a combination of car-controlled and engine-controlled governor would be most desirable if such could be arranged. For instance, the governing device could be controlled by the car speed while in the high gear, a shift to any lower speed automatically connecting the governing device to the engine, so that on low speeds it would be controlled by the engine entirely.

It is evident that a speed-controlling device of some kind is necessary, and such a combination would practically do away with the defects of either the car-controlled or the engine-controlled governor.

WILL RUBBER TIRES BE DISPLACED?

About once a month the daily papers are prone to announce the advent of some wonderful substitute for the rubber tire, a device which will entirely revolutionize the automobile industry and do away with the necessity for using the costly pneumatic or solid rubber tire.

These announcements have been startling the public more or less regularly for the past six or eight years, and the patent office shows thousands of patents on devices for this purpose. Yet we are still using rubber on the rims of practically all wheels of automobiles, either pleasure or commercial. This of course does not prove that some spring suspension or pneumatic mounting of the frame and motor will not be invented which will do away with the necessity for using rubber tires, but all present indications point strongly to a continued use of this most peculiar substance, for many years to come.

If the claims made by certain inventors for their devices are closely analyzed it will be seen that even though their peculiar methods of spring mounting or their interposition of pneumatic cushions between the axles and the body were as perfect as they could be made, yet the action in either case would be entirely different to that of a pneumatic tire or even a solid rubber tire. Let us consider the case of commercial cars and solid tires especially, although it may be mentioned that pneumatics are now playing and will eventually play an important role even in the commercial car field. Let us assume that the spring device or pneumatic invention is so cheap of construction and so light in weight that it is not impracticable. Let us admit that its action is such that the jarring on the engine and body is so greatly reduced that the use of further cushioning effect is not absolutely necessary. Even under these most advantageous conditions such devices do not in our judgment do away with the necessity for the rubber tire. If rubber is not to be used on the rim of the wheels, what material is going to be used? Traction must be obtained by a commercial vehicle and heavy cleats or spikes will not be permitted on our city pavements on heavily loaded trucks. Of course there are wood blocks, malleable iron and steel and numerous combinations which have been tried with greater or less success, yet, when icy weather prevails, none of these are as satisfactory as the rubber tire.

If other than rubber tires are used, the question of noise must be considered, although very little has been done as yet on this side of the water in legislating against noise. This is a matter which has been taken up to a great extent abroad, and will in all probability be treated in the same way in this country. Nothing so deadens the sound of a heavily loaded vehicle as the rubber tire, and this is another reason why the use of rubber tires is likely to continue.

There is a peculiar action of the rubber tire which cannot be duplicated by any spring or pneumatic cushion placed either in the wheel hub, in the spokes, or between the axles and the body. We refer to the imbedding into the tire of small obstacles or, as it is sometimes spoken of, the swallowing up of small stones and obstructions by the tire. This action assists very materially in making the rubber tire the success it is. It deadens the blow or impact and the rubber seems to give back, due to its almost perfect elasticity, the energy consumed in displacing it. No other substance seems to have this property, combined with wearing qualities and other features which are necessary for a tire.

It is believed by some and hoped for by a great many, that some composition which is much less expensive than rubber will be invented which will serve as a substitute on the rims of vehicles. All kinds of combinations have been tried and fortune after fortune has been expended in a futile attempt to compound a substance which will possess these qualities.

We do not wish to discourage inventors or chemists, nor those who are working on this important subject, but we do wish to warn those who are spectulatively inclined, against too readily believing that this or that device will revolutionize the tire industry and do away with the long tried and apparently unreplaceable rubber tire.

STEEL TIRES FOR HEAVY COMMERCIAL TRUCKS

Some experimenting has been done in this country with steel tires, but the French mechanics have worked out this proposition much further and have substituted steel instead of aluminum for the bases of the engine and transmission cases. Also, by careful experimenting they have obtained a nice adjustment of springs, neither too hard nor too flexible, and have softened the greater vibration which the steel tire naturally gives to the machine.

These experiments, conducted over a period of four or five years, have been so successful that the French army, last Fall, passed an order requiring all their heavy five and seven-ton trucks to be equipped with steel tires. They issued this order only after a most thorough and exhaustive test on this style of construction.

For ordinary traction the steel wheel is as good, if not better, than the rubber, but where it is necessary, in especially bad and snowy weather, nonskidding tires can be slipped over the metal tires for temporary use, to be quickly removed when the exigencies of the case are passed.

The great width of the wheel necessary makes it also a great saver of macadam pavements, rolling down the roadbed instead of cutting it up as in the case with narrower tires.

When it is understood that with some manufacturers a guaranteed service of sixty thousand miles can be obtained from these steel tires as against a maximum of about five thousand on the rubber-tired vehicle, it can be readily seen what a vast saving this makes to the user.

With a heavy seven-ton vehicle it almost means a saving of the price of an additional machine.

At the end of this period, the four wheels may again be re-equipped for another term of sixty thousand miles at a total cost of two hundred dollars.

A speed of from ten to twelve miles an hour, it is claimed, can be safely obtained on steel tires. Such tires are now in use by the following well-known manufacturers: Aries, Berliet, Delahaye, Cohendet, Purry, Cazes and others.

Horse-Drawn vs. Motor-Drawn Freight

At a recent meeting of the Motor Truck Club at New York City, A. N. Bingham, sales manager of the Hewitt truck department of the Metzger Motor Car Company, read a very interesting paper comparing horse-drawn and motor-drawn freight. Mr. Bingham made out a very bad case for the horse and, on account of the care with which his data has been compiled, was cordially accepted by the Truck Club as a valuable piece of ammunition. Mr. Bingham's paper, in part, was as follows:

"The subject of operating costs of motor trucks is an important one, but perhaps not so important as some of us have been led to believe.

"In fact, many motor trucks are sold without any question of operating costs being raised by the purchaser. How much money he will save by installing a motor truck he does not know. To begin with what does his horse service cost him? He does not know. What does each package cost per mile to deliver? He does not know. Then how can he compare his horse delivery costs with motor delivery costs? Every owner of horses has an approximate idea of his stable and delivery expenses, but how much of it is for sickness of horses, loss of time through sickness, loss by unavoidable accident, loss by carelessness, cost of sending horses to the country, loss of time by 'soldiering' of employes, stops along the road, delays at piers, ferries, etc.? He does not know, and what is more he makes no effort whatsoever to find out. There is in consequence a great divergence of opinion as to what the daily cost of operating teams of horses really is.

"The average merchant lumps all his expenses together, and divides the total by the number of packages carried, and arrives at a cost per package or per unit. In the case of barrels (sugar, beer, oil, etc.), where the weight is uniform, the total cost per barrel is known, but whether that barrel is carried one block or five miles, seems to make no difference, the delivery cost is reckoned per barrel, not per barrel mile as it should be. With packages of variable sizes, large or small, piazza chairs or pincushions, five miles or twenty, each package is figured out to the same amount.

"Of all delivery costs the most important is that of coal, sand, gravel, etc., where the intrinsic value of the whole load is very small, and practically the entire profit of the business depends on keeping the delivery costs down. Of all merchants, one would naturally believe that the coal dealers of a large city would know to a fraction of a cent what their ton-mileage cost of delivery is. Yet I will venture to say that there is not a coal merchant in Greater New York who knows what it costs per ton-mile to deliver coal in summer, and how much more per ton-mile in the winter. I will go even further and hazard a belief that outside of one well known coal company, not one is attempting to figure it out on a ton-mileage basis.

"Ask such a merchant what his delivery cost is, and he can tell you promptly from 30 to 35 cents a ton in summer, and from 50 cents to 75 cents a ton and even more in winter. Ask him what the mileage is, and he will strike an average of about two miles from his base. He ought to know how much he is making on the short hauls and whether or not he is losing money on his long hauls.

"After careful investigation I am prepared to say that by using motor trucks the cost of delivering coal has been reduced from 30 cents to 35 cents per ton in summer, and 50 cents or more a ton in winter, to around 20 cents per ton all the year around—a saving of from 40 to 50 per cent.

"If the proper items are charged up for depreciation and upkeep of horses, wagons and harness, stable expenses, etc., the round figures of $6 a working day for a two-horse team and driver and $8 a working day for a three-horse team are very conservative. Of course, horses, like motor trucks, can do stunts and cover 30 or 35 miles in a day, or pull enormous loads at times, but for ordinary day in and day out hauling, 20 miles is about the limit for a light vehicle, and 16 to 18 miles for a team loaded with three tons, or a three-horse shift with five tons. On this basis the ton-mileage costs with horses are 18 cents to 20 cents a ton-mile or heavy vehicles loaded in one direction only, as very few teamsters can arrange their business to carry full loads both ways.

"To cover the mileage mentioned horses have to be on the move five or six hours a day; the remaining four or five hours can be spent in loading and unloading, or simply standing still, as the horses require that much rest anyway, and it makes little difference where it is.

"But what about the motor truck? It requires no rest, except such time as is needful for the chauffeur to look it over, oil working parts, fill up grease cups, oil and gasoline tanks, tighten up nuts and make necessary adjustments, and the tedious delays in loading and unloading to which we have become accustomed with horses must be superceded by speedier methods.

"It is sufficient to some buyers to know that the motor truck is capable of at least two or three times the mileage of horses, that they will get quicker delivery and have more satisfied customers and reach out into new territory, and increase their business the very first day they put their motor truck into service.

"From these figures, together with others, the writer has quoted, we find the approximate costs to be $12 per day for a three-ton truck, and $15 per day for a five-ton truck, or 12 and 13 cents a ton-mile, as against 18 to 20 cents a ton-mile for horses.

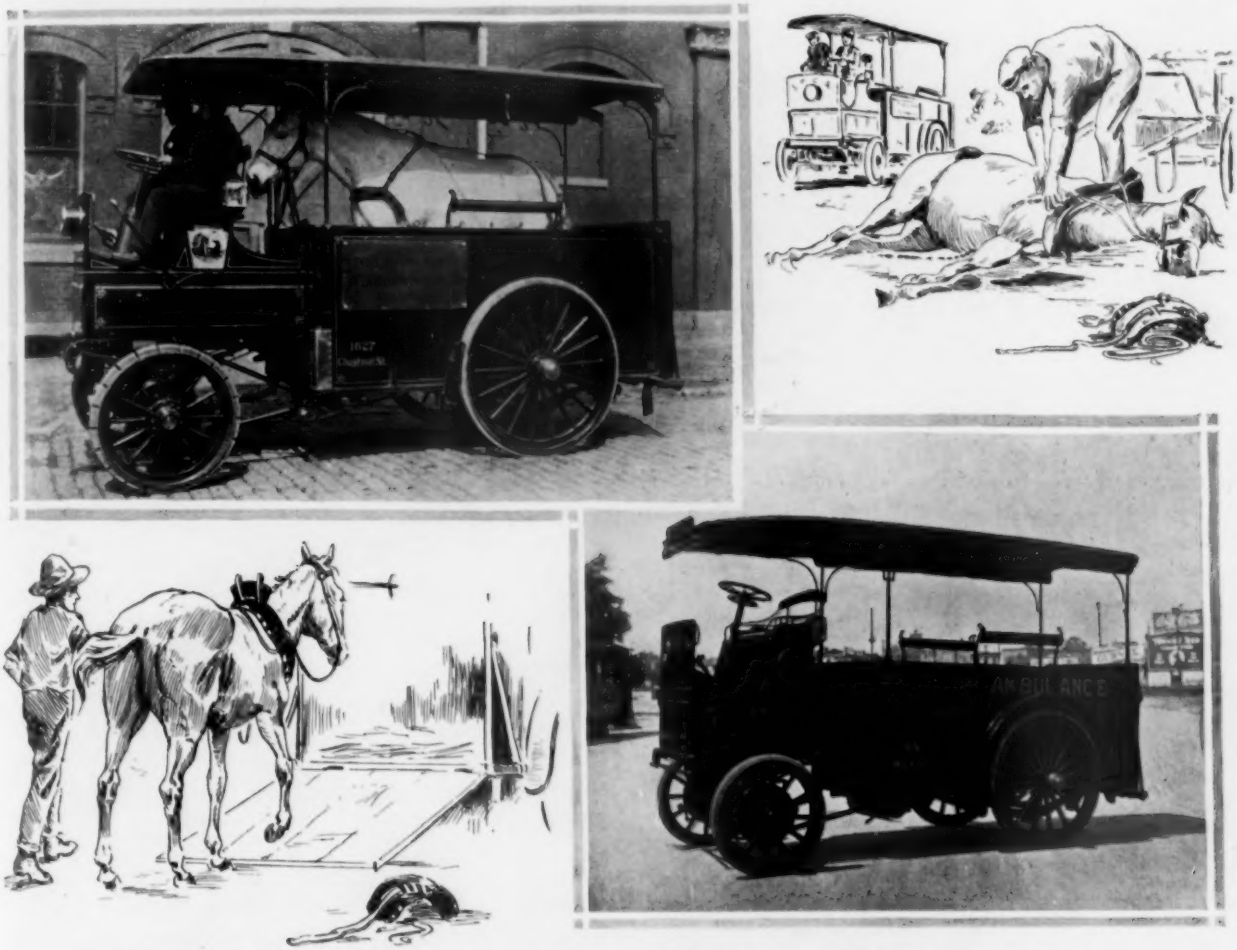
"Surely a saving that, when fully realized, will revolutionize the present methods of city and suburban transportation service.

"It behooves us all, as manufacturers and dealers, to honestly put before the public and the prospective buyer the probable costs of his motor truck haulage, realizing that every installation requires different calculations, but based on the foregoing figures.

"The saving over horses by this modern method of delivery, when properly supervised, is so enormous that none may fear the result of an honest and open comparison, for this is the day of the motor truck, and its future is secure."

Motor Horse Ambulances of Philadelphia and Boston

The Philadelphia Society for Prevention of Cruelty to Animals was the first to install a horse-drawn horse ambulance. This was done in 1874, there now being twelve wagons in the city. In April, 1910, this society installed the first automobile ambulance wagon, which is herewith illustrated. The car was somewhat of a problem to design, owing to the necessarily low platform at the rear. This virtually necessitated a front-wheel drive. The work was successfully undertaken by the Commercial Truck Company of America, in Philadelphia, forty-four cells of eleven-plate Exide battery under the floor boards supplying the current. The society is very much pleased with the work this wagon has done. The cost of maintenance is very much less than that of the old horse-drawn ambulance, which was drawn by two horses, the statement being given out by Secretary F. B. Rutherford that the wagon has not, up to the present time, cost a cent for repairs or replacements. The economy of this installation can be realized from the following figures: For twenty-four weeks, May 30th to November 24th, of last year, the cost of current was $41.25, or only about $1.70 per week. Horses, it will be understood, must be fed, shod and taken care of by a veterinary, even while much of the time they remain idle; all this expense is now eliminated. The machine weighs about 6200 pounds and is equipped with Kelly Springfield block tires. It is front-wheel driven and averages about fifteen miles an hour, covering the entire city, especially for emergency calls where horses have fallen into pits, into the river, or are in other positions from which they should be extricated as soon as possible. The vehicle is electrically lighted inside and outside and has a thirty foot extension light for inspection of horses at night. It also carries a complete ambulance outfit of bandages, turning keys for stopping blood flow, one hundred and fifty feet of rope, etc.



In the upper picture is shown the Philadelphia S. P. C. A. wagon taking away a horse for treatment. Below is shown the new Boston wagon

During 1910 the ambulance responded to 368 calls for the removal of horses and mules from highways, manure pits, excavations and rivers, to stables and veterinary hospitals, this being largely in excess of the number of calls made by the old equipment in the same time.

The society has also recently installed a Haynes 30-40 roadster, which has proven very effective in getting their agents quickly to the scene of trouble.

The Boston Society for the Prevention of Cruelty to Animals has recently installed a wagon similar to that in use in Philadelphia; in fact, developed from the Philadelphia experience, and built by the Commercial Truck Company of America. This vehicle is also shown in the accompanying photographs.

Destructive Effect of Horse and Motor Car Demonstrated by the Champs Elysees, Paris

IT IS seldom that an accurate comparison of the destructive effects on the roads, of horses and automobiles has been compared under similar conditions. A remarkable opportunity for such observations has been given by the Champs Elysees, Paris, during the last five years. This ninety-two foot boulevard was divided into three distinct sections, the central portion being used exclusively by the fastest and busiest motor traffic to be found anywhere in the world, while the side portions are used for horse and miscellaneous traffic of all kinds.

This division was not made by motorists as a means of test, but was divided to give a more imposing setting and effect to official corteges. About five years ago Lepiné, the Paris chief of police, decided that traffic would be facilitated if the fast-moving motor cars were separated from the horses and other slower traffic. The automobiles were therefore confined to the central portion. It is said the change was remarkable. The Champs Elysees at once became the avenue with the fastest and, at the same time, the safest traffic in Paris. The annoying blockades which formerly characterized the traffic of this avenue ceased entirely, accidents became less frequent, and everything was much more satisfactory than formerly.

The most valuable feature, however, at least from the motorists' standpoint, was the opportunity afforded to observe the relative wear of the various portions of the roadway owing to the different kinds of traffic. The chief assistant engineer of the street department stated that he was convinced that fast motor traffic had no injurious effects on well-laid wood pavements. This pavement is capable of withstanding very heavy loads when not subjected to violent shocks. These conditions are realized with rubber tires, either solid or pneumatic, and the blocks are evenly worn down without showing disintegration. This is not true with macadam, which is destroyed by fast traffic.

This street shows that on this kind of pavement motor traffic is less destructive than any other kind and effects a double economy; namely, less repairs and a lower expenditure for street cleaning.

Dripping Oil Helps

A noticeable feature of the Champs Elysees is the fact that the central portion is of darker hue than the outsides. This is due to the gradual dripping of oil, which, although imperceptible from any one vehicle, has been sufficient in five years' time to thoroughly impregnate the paving blocks with oil, making them very much more impervious to water, and thus preserving the surface. It is claimed that the central portion of this street is practically never cleaned, as the automobile brings no dirt and the suction is sufficient to sweep to either side any slight accumulation which might possibly occur. The charges brought by the engineers against the horse and narrow iron tired carriages, as street destroyers, were very emphatic; an examination of the street showed that the blocks were destroyed by the picking of the horses' hoofs and the roughing action due to acids and horse deposits. The blocks in the center of the road were practically working under ideal conditions, while those at the sides were working under most adverse conditions. It is not surprising that, under the circumstances, the road devoted to motor cars is standing up much better than that devoted to horse traffic.

The Champs Elysees pavement consists of blocks of pine with rather wide joints made with cement, the blocks being laid in cement over an old pavement, having a depth of about six inches. The blocks were treated before being laid, but no attempt was made to tar or oil them or to make tarred joints.

As this street was not laid as an experiment, there is unfortunately no record of the comparative cost for maintenance, but the statement was made by the road engineer that for every two square meters of repairs on the motor track there had been at least eight square meters on the horse section. So marked has been the preservation of this wood-block pavement, due to the automatic oiling from the motor traffic, that it has been decided to sprinkle all future wood block pavements with oil to obtain the same results.

PERSONAL NOTES

D. E. WHIPPLE, formerly of the Northern Electric Company of Cleveland, O., has joined the selling force of the Anderson Electric Car Company, of Detroit, Mich.

G. L. SCHOFIELD, who has been a special representative of the Columbia interest in St. Louis, has become sales manager for the Columbia concern with the Kansas City branch of the United Motor Company.

THE LICENSED AUTOMOBILE DEALERS of New York have decided to take an active part in the promotion of the commercial vehicle, as most of the members represent concerns building work vehicles as well as pleasure cars.

FRANK W. TUCKER, of Boston, Mass., who has been for eleven years identified with the sale of Goodrich Solid Rubber Tires, recently closed out his personal business and became affiliated with the B. F. Goodrich Company.

A. L. SIEGRIST, who has been with the Swinehart Tire & Rubber Company during the past seven years, has resigned his position with that firm to accept a position as traveling representative for the truck tire department of the Republic Rubber Company, with headquarters at Detroit.

C. H. WALLERICH has recently accepted the position of assistant general manager of the Mais Motor Truck Company, of Indianapolis, Ind. He was formerly connected in selling capacities with the Overland and Marion companies, of Indianapolis, and the Haynes Company at Kokomo.

ATCHISON, KANSAS, had a $150,000 fire the other day. Her citizens believe that the damage done would have amounted to about fifty dollars if the town had modern fire fighting apparatus. The demands of business men have had their effect in a recommendation by the fire committee of the city council for the purchase of $13,000 worth of motor truck fire-fighting machinery. The funds will be available and bids will be advertised within the next few weeks.

SAMPSON TRUCK MAKES TRIP

An overland trip from Rock Island, Ill., to Chicago by a four-ton Sampson freight motor, averaging nine miles an hour for a distance of two hundred and twenty-five miles, made an impressive demonstration of reliability before thousands of farmers and the business men in cities through which it passed. In addition, some of the features for which the Sampson is entitled to especial recognition were brought into play in an interesting and instructive manner.

The truck had been demonstrating in Rock Island, Ill., and it was decided to send it back to Chicago under its own power to demonstrate the reliability in a hard cross-country run under trying road conditions.

Between Cambridge and Kewanee, while climbing a steep hill and allowing a team to pass, the wheels of the truck became embedded in sand, which ordinarily would have meant a long and serious delay, but by applying the differential locking device, with which all Sampson freight motors are equipped, the machine quickly and easily pulled out under its own power, this device enabling the driver to apply the full power to whichever wheel has traction.

PICTURESQUENESS vs. PROMPTNESS

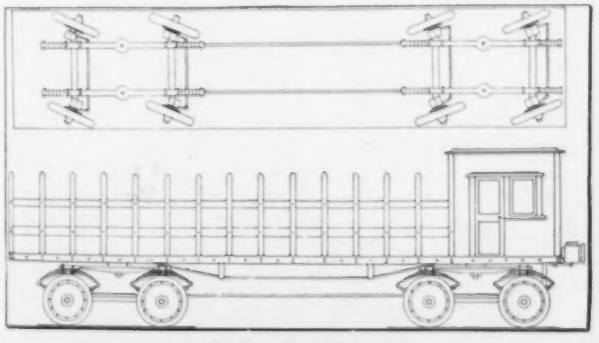
The following paragraphs appeared in a New England daily newspaper:

Who Wants a Gasoline Fire Department?

Automobile apparatus may be all right from a practical standpoint for the putting out of fires, but it takes away a big element of color and beauty, of picturesqueness and dash from the fascinating occupation of running with the machine.

Who, after seeing Engine No. 2's splendid gray team, come plunging through the Center on Wednesday, each of those three powerful horses straining gallantly at his harness and sharing all the human eagerness to get to that fire and put it out, could see anything really thrilling in the spectacle of a lot of men in rubber coats shooting along in a commonplace automobile?

Is not the saving of human lives and property of more importance than the panoramic view of dashing steeds and fire-spurting engines? The day of chariot races is past. It is hoped that city officials who are contemplating the purchase of automobile fire apparatus will not be influenced by the sentimentality of such articles.



A Twenty-Ton Freighter

B. W. Davenport, of Minneapolis, Minn., has recently designed a twenty-ton gas-electric truck, each wheel of which is driven by an electric motor. A feature of the car is that it dispenses with differential gearing. The rear wheels turn in a circle of the same radius described by those in front. The gearing from the motor to the wheel is compound, first reduction being by chain, second by spur gear. The platform is 30 ft. long and is provided with a winding drum. The wheels are 36 in. in diameter and are fitted with 6 in. tires. Current for the motor is furnished by a 125 volt generator, driven by a 50 h.p. gasoline motor.

Taking Its Own Medicine

To prove that their pneumatic tires are capable of withstanding the hard service occasioned by hauling, and that pneumatics are more adaptable to certain kinds of work, the Michelin Tire Company, of Milltown, N. J., recently purchased a 1½ ton, 20 h.p. White gasoline truck and equipped it with Michelin expanding rims on the front wheels and Michelin dual expanding rims and twin tires on the rear wheels.

A large tonnage of material is shipped to the concern, by boat from New York to New Brunswick, and from there is daily transported by the car to the factory at Milltown, a distance of four miles. The results have been highly satisfactory, allowing the lowest possible shipping and transportation costs. The pneumatic equipment permits much higher speed than is possible with solid tires, so that approximately three times as many trips per day can be averaged than when solid tires are used.

GOOD ADVICE TO COMMERCIAL CAR TIRE USERS

BY J. F. SINGLETON, of the Firestone Tire and Rubber Company

It is an assured fact that better tire service would be secured on ninety per cent. of all the motor trucks now in service if drivers understood the necessity of observing certain rules and recommendations in the handling of their vehicles. This is a point which is appreciated by all good tire manufacturers who are not so anxious to sell a new set of tires as to carry out the farsighted policy of ensuring better service to users. The following rules will be found to be most essential for observance by the driver in order to get the greatest service possible from his tires:

1. Avoid overloading the vehicle, because of the heavy stress it places on the mechanism and tires.

2. Do not overspeed, as the tires and mechanism have their limitations and if persistently overtaxed, they cannot give their full length of service.

3. Keep brakes working with equal pressure on each wheel, and the axles and wheels trued up. This saves rack and wear on the running gear and prevents unusual stress on any one of the tires.

4. Do not allow oil or grease to accumulate on rubber tires, because this will cause them to decay.

5. Always start the vehicle before turning the steering wheel; because the act of turning the front wheels when vehicle is standing still places a heavy and unnecessary stress upon the tires.

6. Start and stop gradually and avoid jerky motions under all circumstances.

7. Do not persist in running vehicle along street car rails, as that grinds off the edges of the tires.

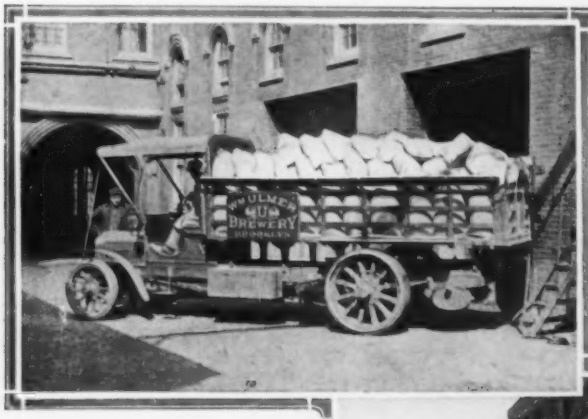
8. Always, when possible, choose the smoother pathway, avoiding obstacles and road irregularities, and cross car tracks perferably at an angle.

9. As merely resetting or repairing a side-wire tire will, in many cases, double its life, have tires attended to promptly in order to secure this extra service.

Motor Trucks in Brewers' Service

BY CHARLES B. HAYWARD

ECONOMICAL delivery is a matter of vital importance to the brewer, as more than eighty per cent. of his product has to be delivered directly to the distributor. This is a striking contrast to the average manufacturing business, where the bulk of the product reaches either the distributor or the consumer by freight shipment, and but a comparatively small proportion of it has to be handled by wagons. Moreover, weights are unusually high, while the distances are much greater than are ordinarily found in wholesale distribution from which it will be apparent that necessity has largely been accountable for the very general adoption of the commercial car by breweries. Taking New York City as a criterion, it is safe to say that there are more heavy motor trucks in use by breweries than can be found employed by any other single industry. An added factor influencing the adoption of commercial cars for this service is to be found in the disproportionate weight of the package or barrel, to its contents, as well as the value of the barrel, making it necessary to pay high freight charges both ways, where shipped by rail. For this reason, only heavy motor trucks are employed by brewers, those of five-ton load capacity having been almost universal up to recently, when some of the seven-ton type were placed in service by New York brewers.



Heavily Loaded Saurer Truck; used by a leading Brooklyn brewer

Truck Loaded with Bottled Beer; showing one style of body used for this work.

Starting to Load for a Long Haul

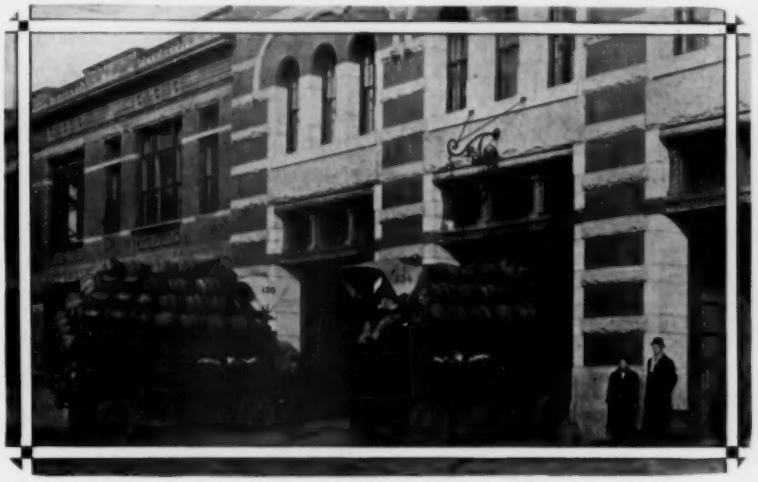
To properly appreciate the value of the commercial car to the brewer, some idea of the conditions of the delivery service of a modern brewery must be given. With few exceptions, the business of even a large brewery, particularly when located in a metropolitan center, such as New York, is very largely local. That is, its product is distributed over a comparatively small radius, seldom greatly exceeding one hundred miles. Of the total, about 75 per cent. of the business is located within a ten-mile radius of the brewery, 15 to 18 per cent. within 15 to 30, miles, and not much more than 10 per cent. at a greater distance. The question of distribution accordingly divides itself into a matter of handling a large number of routes of comparatively short distance, not exceeding 20 miles for the round trip, and a few runs of 40 to 60 miles for the round trip. Anything beyond that, naturally has to be handled by freight, and until the introduction of the commercial car, it was always necessary to ship by rail for anything but the purely local business. Motor trucks now take care of the long runs, and their superiority on the shorter ones is such that the field for horse delivery is constantly becoming more and more restricted. They have also been responsible for expanding the business done at a greater distance, which could not be handled by horses at all, and on which freight charges were disproportionately high, so that the percentage of outside business is gradually assuming a more favorable proportion to that of the local deliveries than the figures mentioned. None of the up-to-date breweries in the vicinity of New York now employs horses for anything but short hauls—twenty to twenty-five miles are considered a day's work for a team, and this is divided into several short trips, rather than one long one, which can be handled to much better advantage by the motor truck.

Trained Organization Necessary

During the next few years horse-drawn equipment will undoubtedly be replaced by motor trucks to a constantly increasing extent, even for local deliveries. That this has not already been done is not due to the fact that the motor truck cannot show an equally great saving for short distances, but on account of the large investment in horses and wagons that most brewers have at present. To sacrifice this by dumping it on the market as a whole, would not alone result in great

loss, but would be inexpedient from many other points of view. To properly handle and maintain a large equipment of motor trucks demands a trained organization that cannot be built up in a short time. It is accordingly good policy for the present to use the motor truck for business that either cannot be handled at all by horses, or that could only be done in that way at a great disadvantage, displacing horse equipment with commercial cars only as fast as the former becomes unfit for further service.

Among the large number of trucks in brewery service in and around New York, the Saurer is well represented. Most of these are of the 4½-ton size with a few of 6½-ton capacity, and the number is rapidly being increased. The work performed by these trucks throws considerable light on their value to the brewer, for both long-distance and emergency service, and at the same time serves to give an approximate idea of the cost and maintenance. With few exceptions, the breweries are located in the Williamsburg district of Brooklyn, and their delivery radius takes in the upper part of New York City proper, as well as outlying towns on Long Island, twenty to thirty miles distant. The rating of the Saurer trucks is very conservative, as they have a normal capacity of fifty half-barrels of beer, or five tons (seven tons for the 6½-ton size) the barrels averaging 210 lbs. each. They are also capable of standing an overload in excess of this, but it is equally poor policy to overload a motor truck as it is to overload a horse—both will suffer in the long run. When carrying bottled beer, the weight of the load is about the same; that is, in the neighborhood of five tons.



Two Big Electric Trucks in Brewery Service

These trucks average about 60 miles a day in service, or three times the maximum distance possible with horses. What would be an all-day trip, taking 12 to 14 hours to make with horses, is now covered in the forenoon with one of these trucks, and they are sent out on an equally long trip in the afternoon. It is only when they make an unusually long run, that is, at least 25 miles each way, that but one trip a day is made. In this class of service, they are performing work that could not be carried on at all with horses, and at very much less expense for freight shipment, as the latter frequently involves horse haulage at both ends, in addition to the cost of rail transportation. On long distance hauls that are within the capacity of horse-drawn trucks, one of the Saurer 4½-ton trucks replaces three teams, due to its greater carrying capacity and higher speed, while for local deliveries each motor truck replaces two teams and wagons.

Approximate Costs

While it is very difficult to obtain exact figures covering the total cost of operating these motor trucks, including interest on the investment, depreciation and the like, some idea of their economic advantage may be gained from the following general comparison. Where a brewer does not maintain his own equipment of horses and wagons, it is customary to contract for this service at the rate of $7 per day, which includes the use of the horses and wagon, as well as the wages of the driver. It may be assumed from this that where the brewer does maintain his own delivery service, it would cost him at least $30 per week per team, as there would have to be at least 25 per cent. margin for the contractor to make it profitable, taking this figure on the basis of $42 per week per truck, where hired wagons are employed. This only covers the actual cost of maintenance, however, and does not take into account, interest, depreciation, insurance or other similar items, so that both forms of service are compared here on an equal footing.

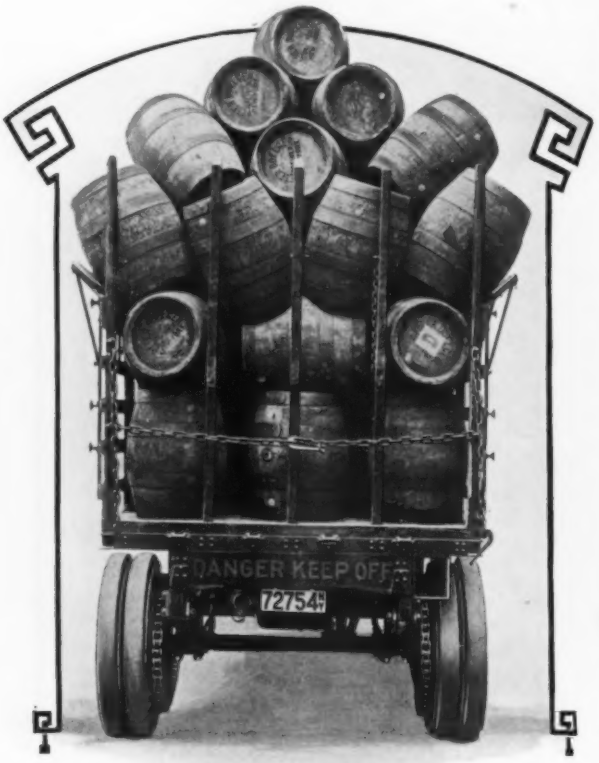
As the Saurer 4½ ton trucks will run from four to five miles on a gallon of gasoline, and in the course of a day's service will consume about one gallon of lubricating oil, and gasoline costs about twelve cents per gallon in bulk, and high-grade lubricating oil costs thirty cents per gallon by the barrel, this, with the driver's wages at $3, which is the customary rate paid, brings the daily operating expenses of one of these trucks to $5.60, based upon an average of sixty miles per day, though longer mileages are nothing uncommon. Tire expense can only be estimated. A complete set of imported tires for such a 4½ ton truck costs $864. These tires are guaranteed for ten thousand miles, and there is no expense for repairs during their life; they are simply allowed to wear to a point where it is necessary to replace them. On this basis, the cost per mile figures out at .086 cents, or an additional item of $4.16 per day, bringing the total average daily cost of operating a 4½ ton truck to $10.76, on a basis of sixty miles per day, as compared with $21 per day for three teams in long-distance service, such as the motor trucks usually perform. No charges for repairs or any expense of a similar nature are taken into consideration in either case.

This showing is not as favorable, however, as the cost of running these trucks actually works out in practice, as the tire expense is greatly reduced by the fact that the tires in question usually exceed their guarantee of 10,000 miles by a very substantial margin, it being nothing unusual for a set to run double this distance or even more, before requiring replacement.

Brewers Testing Commercial Cars

If the numerous large breweries in and around New York may be taken as a criterion, brewers generally show a most progressive spirit where the motor truck is concerned. Probably to a greater extent than any other single industry, are

they carrying on a quiet and persistent elimination test of their own. Satisfactory service, seldom, if ever, fails to bring its own reward in the form of reorders, so that it is nothing unusual to find several trucks of one make in the service of the same brewery, but this does not deter the trial of other makes and reorders for them as well, where they prove out.



Rear Elevation of Brewery Car; showing method of stacking barrels

One establishment will accordingly have several different makes of machines running, and, frequently, two, three or more of each make of truck. As a close record of their running is kept, number of days in service, cost of maintenance, repairs, reliability on the road, cost of replacement parts and the like, an excellent opportunity is afforded for comparison, and it is nothing unusual to find a certain make favored by one brewer, while a neighboring establishment pins its faith to another. Each brewery has its own repair shops and corps of trained drivers and the opinions of the repairmen and drivers are very decided for or against certain makes of trucks, but as is not infrequently the case, these are often based upon trivial shortcomings of the machines, or are mere personal opinion, so that they do not always correspond with the showing of the records.

One of the first heavy trucks to be taken up by the brewers in the vicinity of New York was the Mack, and that it has proved its ability in this trying field of service in no uncertain manner, is very evident from the great number that are in use today, many of the breweries having from two to six or more of these machines, orders for as many as four being placed within a few months as the result of the success of the first one tried. A pretty accurate idea of the cost of maintenance for trucks of this make of the five-ton type may be had from the following records, which, as will be noted, include every item of expense. They are based on the same mileage as that already given in the preceding case, i. e., 60 miles per day, and it will be apparent upon comparing them, how closely the various items which affect the general load efficiency check up. While the machine in one case is rated as having but 4½ tons load capacity, and five tons in the other, it will be seen that this is only normal and has little or no bearing on their actual capacity, as in one case the truck is designed to carry 55 half barrels of beer, and in the other 56, thus making the live load in both cases slightly over five tons.

Larger Capacity Units Most Efficient

In the case of the Mack trucks, it is also possible to compare the cost of maintenance of the four, five and seven ton types, illustrating in a striking manner how the load efficiency increases as the size of the unit is enlarged. This is true to such an extent that the use of the seven-ton truck will undoubtedly vary generally into favor within the next few years, whereas now the common practice is to employ nothing larger than the five-ton size, except in a few instances, and those of trucks recently acquired. The cost per mile of running a four-ton Mack truck figures out at 3 cents per mile for fuel, one cent for lubricant, and 4½ cents for tires. Figuring the driver's wages at $3.34 per day, or $20 per week ($18 is a more usual figure) interest at 6 per cent. and depreciation at 10 per cent., the daily cost of running one of these trucks 60 miles, totals $12.34, made up as follows:

Four-ton Mack Truck, 60 miles per day—

Gasoline, 3 cents per mile	$1.80
Oil, 1 cent per mile	.60
Repairs and renewals exclusive of tires	1.30
Tires, 4½ cents per mile	2.70
Driver at $20 per week	3.34
Interest on Investment (6 per cent.) and insurance	1.10
Depreciation 10 per cent.	1.50
	$12.34

Type of Electric Panel-Body Brewery Truck Used for Delivering Bottled Beer. Some have sliding side doors and hinged rear doors, this machine having all doors hinged, and step at the rear and side.

The slight increase brought about by increasing the load will be apparent upon comparing the two following tables, showing the cost of maintaining five and seven ton trucks of the same make, with the foregoing:

Five-ton Mack truck, 60 miles a day—

Gasoline, 3½ cents per mile	$2.10
Oil, 1 cent per mile	.60
Repairs and renewals exclusive of tires	1.50
Tire maintenance, 5 cents per mile	3.00
Int. on investment (6 per cent.) and Insurance	1.25
Depreciation 10 per cent.	1.50
Driver at $20 per week	3.34
	$13.29

Seven-ton Mack Truck, 60 miles per day—

Gasoline, 4 cents per mile	$2.40
Oil, 1½ cents per mile	.90
Repairs and renewals exclusive of tires	1.80
Tire maintenance 6 cents per mile	3.60
Int. on investment (6 per cent.) and Insurance	1.50
Depreciation 10 per cent.	1.75
Driver at $20 per week	3.34
	$15.29

It will be noted that while there are slight proportionate increases in the cost of fuel, oil, repairs and other items, the largest single increase is that due to tires, owing to the great increase in the weight of the load carried, but that on the whole, the expense of maintaining the larger trucks is wholly disproportionate to the greater load carried, and is very much in favor of the use of larger units, particularly where they can always be run with the maximum load, as in brewery service.

That these figures are not merely theoretical, but are taken from actual practice, will be evident from the following cost sheet showing the expense of maintenance for six months of a five-ton Mack truck, though in this case the daily mileage was only half that upon which the foregoing results are based, so that the cost in proportion is slightly greater. The truck in question has been operated steadily during the period in question in the streets of Chicago, and as the pavements are notoriously bad, the tire expense is correspondingly larger than where good conditions prevail.

Cost of operating Mack five-ton truck, August 1, 1910, to February 1, 1911.

Average daily mileage 31.2.

Gasoline, 986 gallons at 12 cents	$118.32
Oil, 156 gallons at 31 cents	38.36
Parts—	
Tires	168.39
Driver	468.00
Insurance—fire and liability	115.00
Depreciation 10 per cent.	265.00
	$1173.07

Cost per working day, $7.17; number of days in service, 152; total mileage, 4680; miles per round trip, 15; number of trips, 362; miles per gal. of gasoline, 4.75; miles per gal. of oil, 30.

A Comparison

When the distances are great and the loads are heavy both ways as in brewery service, where the truck returns with empty kegs, or cases and bottles on practically every trip, the comparison of the cost per ton mile between the commercial car and the horse is such as to make it evident, that in this field at least, the passing of the horse is not many years distant. Taking the investment represented by a team and wagon as $1000, with that of a five-ton truck as $5000, and figuring $6.50 per day with an average load of three tons and daily mileage of 20 miles, this figure including interest and depreciation, as well as feed, stabling, wages, repairs and the like, works out at 11 cents per ton mile for the horse, while the five-ton truck with five tons for 60 miles is but 4½ cents per ton mile.

But as has already been made plain at the outset, the brewer's delivery problem is not merely one of long distance hauls; it includes everything from the haul of a few city blocks up to a trip of 30 miles each way, a distance beyond which no attempt has been made to deliver goods by commercial cars, at least not so far as the writer has been able to find out. There are accordingly many sides to it and it is only by careful study of the requirements that an economical and efficient service can be organized. Though having the same general features each brewer's delivery is really a problem in itself, which probably accounts in some measure for the varying standards followed, even by breweries located across the street from one another and apparently having identical requirements.

Electrics for Short Hauls

For the short haul work which constitutes such a large percentage of beer deliveries, the electric has come into strong favor, and is undoubtedly destined to gain a stronger and stronger hold on it in the next few years. The reasons for this will be apparent upon a little consideration. Modern breweries employ electric drive throughout and accordingly have large generator installations. This makes power available at low cost, while the fact that the breweries work twenty-four hours a day and seven days a week, makes it possible to charge to the best advantage. This extremely important function in the working of an electric does not have to be done hurriedly, to the detriment of the battery, as is not infrequently the case.

An Electric in Service Ten Years

It sounds a bit misleading to say that the electric has come into favor—it has been very favorably regarded in this field for a number of years far antedating the arrival of the practical gasoline truck on the scene. An excellent illustration of this is to be found in the G. V. electric truck purchased by the Central Brewing Company of New York, ten years ago, the first to be put in use for this purpose. This machine was put into service at a time when not alone the building of electrics, but the commercial car industry as a whole was in its infancy, and the fact that it is still in daily use after ten years of the hardest kind of service over pavements that are none too good, constitutes a record that it would be difficult to equal. Brewery horses are usually

thoroughbred percherons and are an object of admiration to the horse lover, but it is doubtful if many of them ever see that number of years in steady service. This truck, which was facetiously christened "Mary Ann" on the occasion of its baptism a decade ago, is the prototype of an electric truck which has now been developed to a point so close to the ideal, both electrically and mechanically, that it is believed there will be little incentive to replace it for ten years from now with one having slightly better characteristics. "Mary Ann's" success in service was such that her owners have since added thirteen more electric trucks.

One of the first large breweries in the East, if not in the country, to definitely plan the complete elimination of the horse, is the Doelger brewery in New York. This concern is at present operating no less than thirty G. V. electric trucks, eighteen of which are of the five-ton open type, with stake bodies for carrying kegs, while the remaining twelve are 3½ ton panel wagons for carrying bottled beer. The records of this installation, in service for a number of years, shows a net saving of 27 per cent. over horse delivery; to which must be added the saving of 75 per cent. of the space for storage, which is a big item in a city establishment, as well as the fact that the actual time required for delivery is just about one-half.

Large Mack Truck Just Starting With Fifty Half Barrels

To more closely meet the demands of this industry, electric vehicle builders are designing bodies specially adapted to the requirements. This is particularly the case with wagons for delivering bottled beer. For this service, a closed or panel body is used, with sliding doors on both sides and hinged doors at the rear, this being a type employed by the S. Liebman brewery in Brooklyn, while in the Doelger wagons already referred to, the doors on both side and rear are hinged. The Bergdoll Brewery in Philadelphia uses a covered slat truck with chain openings on the sides, as does also the Poth Brewing Company in the same city. The latter company now has a fleet of twenty-four G. V. electrics, most of which are of five-ton capacity.

The Anheuser-Busch Brewing Association, of St. Louis, Mo., has been a prominent user of commercial cars of both the gasoline and electric type for a number of years, but its appreciation of the economy of the electric for city work is to be seen in the fact that it now has no less than thirty-one G. V. electrics, four new ones having recently been ordered from the builders, the General Vehicle Company. Installations that compare favorably in size with this, are the Doelger, mentioned above, which has thirty, the Ehret Brewery in New York, with twenty-five G. V. electrics; Schmidt brewery with twenty-three, while there are a large number of brewers in various parts of the country who employ anywhere from one to ten.

When it is borne in mind that these figures only apply to the vehicles of a single make, and that even in the instances mentioned where twenty to thirty of that make are used, the same brewers also have electrics of other makes, Studebaker, Commercial and Waverley, while many of the old E. V. trucks are still in service, the importance of the electric truck to this industry can be appreciated.

There appears to be little doubt that between the gasoline and electric truck, the horse will have become entirely a thing of the past for brewery deliveries before the passing of another decade. Some idea of how big a field this represents for exploitation on the part of the commercial car builder, may be gained by citing but a single instance. The brewery in question is one of a number in Brooklyn, and while it will compare favorably in size with any of those in the metropolitan district of Greater New York, it is not unusually large as breweries go. Its equipment at present consists of six five-ton gasoline trucks, among which are included the Mack and Saurer, and several G. V. 3½ ton panel body wagons for bottled beer. In addition to these, it maintains regularly the year round, 216 horses, and when the demand is unusually heavy these do not suffice, outside service being contracted for to take care of the excess.

It will be apparent from the foregoing that the ideal delivery service for a brewery consists of both gasoline and electric commercial cars, the numbers of each being proportioned according to the manner in which the service required is divided between city and country work, although some brewers favor the gasoline truck even for city service, and both types are found competing on the same ground.

The Commercial Car for Long Hauls

Some Possibilities of Inter-City Communication. What Can be Accomplished

PART II.

In Part I of this sketch, the commercial car as a competitor of the railroads and as a relief for railroad freight congestion was considered, and reasons were set forth why, for long hauls, this method of freight transportation is possessed of advantages foreign to other systems. For the purposes of illustration, let the radius of effective action be conservatively regarded at 100 miles, though those conversant with the situation will readily realize that 200 miles would be permissible, since it appears to be well established that up to this distance the advantages are clearly with the commercial car. However, the conservative rating will do very well for the purposes desired. At the very outset it must be realized that with the commercial car there is a minimum of load handling, it is simply a case of direct transportation which for inter city communication is most to be desired since there is effected a big saving in time. With freight train service there alone is one big argument in favor of the up-to-date since the commercial car eliminates these annoying delays, there alone is one big argument in favor of the up-to-date method.

That the commercial car is making inroads is obvious from a careful survey of the field, and that railroad officials are considering the situation seriously is also evident. It is not so very long ago that the trolley systems throughout the country were first utilized for freight transportation, and what was the result once the business became established on a solid basis? Simply that the railroad which felt most the effect of the new competitor found it convenient to graciously absorb the trolley system, which had previously proved to be an annoying factor in the affairs of the road. That at least is the program in some sections of the country. The trolley has gained business owing to the lower rate, both for passengers and freight. But even the trolley had its limitations much the same as the railroad proper, for here also there must be several shiftings of the loads.

Serving Suburban Station by Commercial Cars

Many department and other large city stores now deliver goods daily to the suburbs, covering effectively a territory of thirty and even forty miles in diameter

The Point to Consider

The points then for the shipper to consider are the numerous inherent advantages of the commercial car system, properly conducted. It means that by this method a buyer of goods, 25, 50 or even 100 miles away can receive those same goods

at his door without bothering about sending a team to a freight station to collect them. Time and again has this point been brought out forcibly when a buyer was in a hurry to have his purchases shipped to him. Assume, for example, that a large dry goods house in New York sold a bill of goods to a resident of New Haven and the man from the Elm City wanted them quickly. It would take some time to get them to the freight station and as much time to get them into the possession of the express companies, while in that same time the commercial car could be well along the way to New Haven. Change the scene to Philadelphia. The same holds true there. Let the purchaser who is a good customer of the firm and one who should be accommodated, be a resident of Trenton, the result is the same. Order in the morning, goods delivered in the afternoon at Trenton, prompt, efficient service and a satisfied customer; direct transportation and no fuss at destination. The main point then to be considered is that "direct transportation" is possible, and this is a feature of commercial car use which is very important..

Possibilities of Inter-City Communication

In the business world time means money, and the commercial car has over and over again proved to be a time saver and a money maker. Possibly it will be construed to be a very broad statement to assert that the commercial car is without a peer for long distance work, but one has only to investigate the subject to ascertain that in seven cases out of ten the reason why commercial cars are used at all, is because they are better than any other method of transportation for long hauls.

The writer recently interviewed the user of a fleet of cars and inquired as to the service and if horses were still used. The reply was that horses were still used and would doubtless be for some time to come. But this owner laid especial emphasis on the fact that the commercial cars were very efficient for long distance work. To quote the user, "For long hauls give me the commercial car, it has the trolley and the railroad beaten, it is the quicker and cheaper way." Therefore, it follows that if commercial cars are especially adapted for long distance work they are especially useful for inter city communication. Some users are only waking up to this fact. A caterer in the east had a two-cylinder car which did good service. This was used in carrying sundries and the like for banquets in the more remote parts of the town. A garage man sold him a four-cylinder motor and a three-speed transmission. The user was very well satisfied with the deal, and about the first real test of the car was the transportation of the necessary fittings for a fashionable wedding "over the mountain" fifteen miles from the city. The roads were hilly and none too good, but the trip was made without incident. Trolleys were hardly available and the train was out of the question. This one performance opened the eyes of the owner. Now the car is used throughout the state and wedding parties 50 or 75 miles away are easily served. The improvement here tells the story, increased business due to ability to deliver direct from the store in one city to the party in another.

What it Means to Remote Settlements

In the more remote settlements throughout the country communication is obviously slow. With commercial motor cars it becomes possible to obtain from city markets those things essential to existence and general welfare, in sufficient time to have them prove duly useful. If one lives in the "woods," so to speak, one does not care to be completely isolated. The back country sections will be vastly benefited when commercial car long distance service becomes well established. The trolleys and the railroads cannot reach anywhere in remote sections, but the commercial cars can. He who tills the soil and has to buy in a market 25 miles distant must haul his own purchases or else travel miles across country to a freight station. Such districts do not build up rapidly, but just the minute he proves that goods can be delivered at the door, the same day they are purchased, that district immediately becomes habitable. The agriculturalists are a thinking class, and while perhaps conservative, are quick to perceive the value of a new method. Ability on the merchant's part to serve them promptly means more and better business for he who can and will do it.

A middle western piano builder uses trucks and horses and, according to his own statements, if a delivery is three miles from the sales rooms horses are used, above that distance the trucks. The statement here is that the horse is equal to other modes of delivery up to about three miles.

What Can Be Done

As has been previously pointed out, improved roads lend an influence to long distance development. It need hardly be mentioned that fairly good roads are necessary, more especially in the early spring and late autumn. A good country road,

A Progressive Caterer's Car
This store serves many distant weddings and social gatherings

dirt formation, in dry weather is nothing to be alarmed at. The writer recently had a long distance demonstration through Indiana, and the roads were for the most part hard dirt and sand. Continuous horse travel had worn a rut in the center of the road about a foot deep, leaving on either side a broad track, hard and fairly level. The commercial car here, to a certain extent, was traveling over just as good a road as would be had in the city, in some respects better. However, a day's hard rain would tell a different story. Taken as a whole, the average country roads are quite passable and can be negotiated by any good car in the care of a capable driver. That roads will be bettered is quite certain, if for one reason alone. Agriculturists as a class are purchasing pleasure vehicles which are for the most part of the utility sort, that is, a type that

can be used for pleasure and business. Give a farmer a car and his own time, and he is going to have just as good an outing as the city owner, and while he is bumping along over the highways he realizes more forcibly than he can be told, that good roads are essential and he is the man who will see to it that they come. Then, too, since he has frequent occasion to use his car for load transportation, the need of better roads, with him, becomes the more urgent. Men from the country

Meat Car
This machine saves not only the cost of railway haulage, but saves spoilage due to rapid handling

are numerous in the State Legislature. The farmers who use their pleasure cars for business purposes are but demonstrating the utility of the business vehicle for communication between towns. They are setting forth what can be done as well as those who have grasped the situation and will contract to deliver a bill of goods 50 miles away on very short notice.

Some Suggestions

In those states where good roads prevail, there are great possibilities in long distance hauls and operation is under the best of condtions. A commercial car running from New York to New Haven, or even through Boston, will traverse far better roads, as a whole, than would be had about the shipping districts in New York City. The main outlet from New York to the Connecticut state line is in good condition, and Connecticut has not been lax in the matter of highway betterment, and from that border to the Massachusetts line, a commercial car can easily be operated. Over the line there are good roads to Boston. But from one big city to the other makes a two days' run, while a single day is that considered here. From New York to Philadelphia a commercial car can maneuver without difficulty.

The use of the pleasure car has become so common that the highways have been vastly improved throughout the country, so that there remains need but for the incentive to establish inter city communication by trucks. In some New York services the lighter cars travel 25 miles before starting to discharge the load. In the smaller cities the large department stores which have come to handle about everything at reduced and attractive prices, maintain fleets of cars which reach farther and farther out as the trade increases.

Purchasers do not care to lug bundles any more, the days of the market basket are passed; customers now say, "have them sent." The commercial car is the only answer.

The Light Car

For strictly long distance work where a heavy load is to be transported, the large trucks are of course best adapted. There frequently, however, arises need of lighter equipment for what might be termed special delivery. In such cases, lighter cars fitted with pneumatic tires can be employed to good advantage. With a speed of 30 miles an hour it does not take long to deliver light parcels from New York along the Boston Post road into Connecticut. New York, in a sense, is the market for towns along this road as far as Hartford, beyond which point the business may be said to pass Boston way.

Let us assume, for example, that a good customer of a metropolitan cloak store purchases a costly gown for use at some function in New Haven. Being a good customer, the house can well afford to deliver that gown direct to the purchaser in New Haven, who would not care when making other calls to be bothered with it.

Examples of What is Being Done

The best proof of what commercial cars can do in long distance work is, of course, by actual service. Large New York stores are a fitting example, some having cars operating throughout the state, through Long Island, in New Jersey and over the border into Connecticut. It is safe to conjecture that if this service did not prove satisfactory it would be abandoned. Deliveries 100 miles from the base is common. Meat houses make use of commercial cars for outside town deliveries and thus eliminate railway transportation and spoilage.

One concern manufacturing chemicals recently installed a five-ton truck and lately added another. The run one way is 32 miles and railroads, of course, do not now get the business.

A Los Angeles creamery is using a four-ton truck which now does the work of 13 horses. The numerous small runs aggregate 40 miles, and the company state that much more is accomplished than could possibly be done with horses.

A Detroit furniture mover will attempt anything in the state in the moving line with a three-ton truck.

Large Motor Milk Wagon
Rapid hauling is essential and is furnished by motor transportation

An eastern soap manufacturer is using a three-ton truck, the run from the plant to the nearest freight terminal being 10 miles, seven-eighths of which is over macadam, the balance over gravel. The service here represents such a vast improvement that horses have long since been abandoned. The vehicle has now been in service for nearly two years.

A typical installation is that of a three-ton truck in New Orleans, which is used between a plant and the wholesale district 4½ miles distant. Cased goods are delivered to the grocers, barreled molasses being transported on the return trips, thus the round trip is nine miles. The day's work is about 45 miles.

Forty-two Round Trips, 1152 Miles

A six-ton German Daimler truck in the service of a Newark leather manufacturing concern has lately completed 48 round trips from Newark to New York. This makes 1152 miles and there has been no interruption in the service. The total weight carried was 573,868 lbs. of hides one way, or 5.9 tons to a trip. Actual running time, not counting ferriage, was 2 hours and 10 minutes per round trip of 23.6 miles, this distance being measured by a recording instrument, as was the running time. The average speed was therefore about 11 miles an hour, and the time saved by direct transportation and no long delays meant money to the owners.

Another fitting illustration of long-haul ability is the gasoline commercial cars used by the Anheuser-Busch breweries, in St. Louis. These cars, with full load, make anywhere from twenty-five to forty miles outward run from the breweries; a thing that could not very well be done with horse equipment, especially in hot weather, which is common to that section of the country in the late Spring and Summer. By means of these cars the outside deliveries are thus cared for and there is no necessity for shipment by rail within the forty-mile radius.

Then, too, another example in the same city is that of the Fidel Ganahal Lumber Company. This concern uses five five-ton trucks, and the statement is made by the president of the company that the trucks go everywhere that horses ever could go. There is one peculiar feature about lumber delivery which is a story apart, of itself. The consumer, or, in this case the builder, wants the lumber delivered right at the place where operations are in progress; which means many times, travel off of paved and improved thoroughfares. These Fidel Ganahal Lumber Company gasoline commercial cars travel upward of twenty-five miles one way on long hauls. Here is another case of direct prompt delivery. It is not necessary to point out the increased efficiency in this service due to long-haul ability, as it is most apparent.

Long-distance deliveries are also made by the Independent Brewery, of St. Louis. Much of the business of the firm is from outlying towns, and commercial car shipment is not only cheaper, quicker, and more efficient, but goods are less liable to damage in transit.

AUTO FIRE ENGINE REDUCES EXPENSE MORE THAN ONE-HALF

An interesting story of a city's actual experience with a motor fire engine is told in the annual report of Fire Chief Samuel F. Hunter, of Springfield, O. It being Springfield's first venture with the motor engine, Chief Hunter kept an accurate account of the distance traveled, the speed, the number of runs made and the cost of upkeep of the machine in comparison with the horse-drawn fire vehicle also used by the city.

At the end of nineteen months it was demonstrated that the auto engine cut two-thirds off the total expense and took the place of five horses, one steam engine and one combination hose cart, and of course materially increased the efficiency of the department. According to Chief Hunter's report for the nineteen months, the engine, built on a 70 h. p. Thomas stock chassis and purchased from the Webb Motor Fire Apparatus Company, of St. Louis, Mo., pumped a total of twelve hours at fires and made thirty-nine runs. The total cost for gasoline, oils, etc., was $112.56, while the total tire cost was $252.75.

The cost of maintaining horses, the repairs to apparatus and for fuel for the corresponding nineteen months for one of the common types of fire engines was $1,300.

"The auto engine responded to all alarms of fire, not just those in its own district," said Chief Hunter. "And it was almost always the first to arrive at the fire. When ordered home it is always the first to reach the barns and is ready for another call, while the horses are sweating and blowing and often times exhausted.

"The machine has not once refused to respond to a fire. Horses, on the other hand, get lame and sick and it is necessary to always keep two extra animals on hand. Our veterinary bill alone amounts to at least $100 a year."

SAVES $100 PER MONTH

It has been stated under good authority that the city of Dayton, O., has made a saving of over $100 a month by the use of Speedwell patrol and ambulance cars instead of horse-drawn vehicles. Two Speedwell cars, an ambulance and a patrol with emergency stretcher equipment responded to 450 calls and traveled 1826 miles in a single month.

As evidence of the utility of the Speedwell patrol it might be noted that over 200 of the 234 calls made by this car were made while it was doing emergency ambulance duty, 127 calls being to hospitals and 79 being removals to homes, etc.

Where a city requires but one car the Speedwell patrol serves the purpose of both a patrol and ambulance.

Although the depreciation on these cars is not in these reports, the comparison with them and the upkeep expense of the horses is perfectly fair. A team of horses such as is used in public service easily costs $500, and is only good for a few years of this class of work, so that the depreciation in value (when it is considered that one motor car does the work of at least three horse-drawn vehicles) is fully as great as with the motor car. On the other hand, tire expense and the shoeing of the horses bear a very close ratio.

The trucks have enabled the department to dispose of all but four horses, whereas 16 were kept at the stables before the advent of the autos. The present cost of hay is $26 a ton, and with the former horse wagons in the service the cost would have been at least four times what was required to maintain the autos.

One wagon with four horses is still kept at the patrol house for emergency cases, but an effort will be made to have council make an appropriation to purchase another auto patrol. With the equipment the department could handle any emergency that might arise and with much more efficiency.

Prompt Delivery as Influenced by the Specialist

AN ILLUSTRATION OF UTILITY

BY WILLIAM J. JOHNSON

MODERN life encourages specialization. He who perfects along a single specified line of endeavor becomes of value to the community by reason of one particular thing; not that the all-around man is no longer necessary, far from it, but he devotes time and thought to things in general, whereas the specialist looks to one thing only. This is an age of specialists. Doubtless more time is now devoted to specialization than ever before; as, for example, in the medical profession and in mechanics. The motor car industry is especially marked in this respect, one maker producing complete engines, another frames, another wheels, tires, carburetors, ignition apparatus, each according to his desires. As a dollars and cents proposition this is sound business.

So, we should not be surprised to learn, if we are not already aware of the fact, that the specialist has invaded the field of commercial car delivery; and this, much to the satisfaction of those who have found delivery of merchandise a trying problem, for one reason or another. This is especially true of small dealers who cannot, and do not, maintain cars of their own, but who, through the specialist's equipment, are well cared for. As far as the larger businesses are concerned, the specialist is prominent in caring for the overflow and the quick delivery of parcels. It is very obvious that the delivery specialist has an influence on delivery systems in general. There is now more marked evidence of this than ever before, for the specialist has caused thought; and he who causes thought and consideration of any live topic has accomplished something worth while.

Fig. 1. Interior of Central Station, showing bundles lined on the floor, each according to routes and in rotation in relation to route

Value of Specialists

It requires but a moment's reflection to ascertain that there is bound to be a big demand for the services of the man who has specialized on commercial car delivery and is equipped to do business properly. The delivery specialist is of value because of the thought and consideration which he has bestowed upon the subject of delivery; he becomes a specialist by reason of the effort devoted to one topic. He has learned from actual experience what is best and what is not, he knows why the service of certain stores do not approximate standard, why it costs more than it should; he knows the inherent weaknesses of those poor services, and in offering those affected guards against those things which have worked havoc. Otherwise he would have nothing better to offer as a remedy. With him delivery for a *clientele* is a matter of business, and the better he does his work the greater the volume of business he can transact.

We all know that large stores doing a vast amount of business have something of a problem in the matter of delivery of purchases to customers. The time has passed when the customer carries away his purchases; the store has a delivery system, therefore, let the store care for the matter, that is one of the things paid for in making a purchase. Furthermore, the store that can not to-day deliver goods must go out of business, for the purchasing public must be satisfied.

The commercial car delivery specialist is an asset; he is of value to the community; he is a cog in the wheel of progression; he deserves encouragement, and that he gets it is evident from the business done, once he has established, to the satisfaction of those concerned, that he is able to deliver goods and do it satisfactorily and promptly, and, by no means least, cheaper than the store could do it with an individual system.

Why the Specialist is an Asset

Just why the delivery specialist is an asset is clear, for, to say the least, he is the salvation of the small dealer; all that, if nothing more. Imagine what it means to the small dealers to have their parcels delivered promptly and satisfactorily without prohibitive cost. There is a sufficient margin of profit in most merchandise to make it possible, for the small dealer can afford to do it,—to pay a specialist his price for delivery. He then has no system of his own to care for, no bother, delay or fuss. It is all done for him for a consideration; he simply turns his parcels over to the delivery specialist, and there the matter ends. If there is money to be collected, the specialist does that, too.

If the specialist can deliver goods cheaper than the stores with their own systems, that is one good reason why he is an asset, and that he can actually deliver at less cost is certain, according to figures on cost of individual systems.

The Commercial Car as a Factor

But if the delivery specialist can deliver at less cost than the stores, it is due primarily to the efficacy of commercial

Fig. 2. Interior Arrangement of the Four-Cylinder, 35 H. P. Delivery Cars; showing the upper shelves for hats and the like. These shelves can be folded to the sides when not in use.

cars, for it is because these are fleet that the system succeeds. While a bundle is in transit for one store there are others for other stores. The car makes the trip in a short space of time. The saving for stores in cost of delivery when the work has been turned over to the specialist is very marked if that store had been using horses. There are some cases on record where the stores have had their own fleet of cars, and, even then, the specialist could beat the cost and make a snug little profit for himself in the bargain. That is another reason why he is a specialist. Any wonder that he finds business good every day in the week?

Auxiliaries to Large Stores

It frequently happens that the larger stores have an overflow of bundles that need to be delivered in short time, which could not be done if the regular cars were used, by reason of the number of stops to be made before that bundle, in the course of rotation, could be cared for. If the purchase amounts to a few dollars, why, ostensibly the firm can afford to spend ten or fifteen cents to have it delivered promptly. Suppose that the purchase is a fifteen-dollar hat, the margin of profit on the article would well warrant a twenty-five-cent charge for delivery.

Typical Delivery System

A fitting illustration of specialization in commercial car delivery is the case of the Detroit Auto Delivery, which began business in March, last, with two cars. That concern now uses seven delivery cars and two trucks and has placed an order for five additional cars. Business here is done either on a contract at a fixed price or so much for each package. The entire city is covered thoroughly, and the work of several of the larger stores has been taken over, after a demonstration of ability to deliver in good season and do it cheaper than the stores could do it. This delivery company will tackle anything, from a package of needles to a piano, and, if there is something special that must be delivered quickly, there is the equipment to do it.

Long-Distance Delivery

In the natural growth of the business it was found necessary to send a car, once a day at least, to Grosse Point, which is sixteen miles distant, so that the round trip is thirty-two miles. This is but a single illustration of what is, and can be done. In short, the manager of this company has an equipment with which the city can be thoroughly covered, as well as the outside sections.

System of Pick-Ups

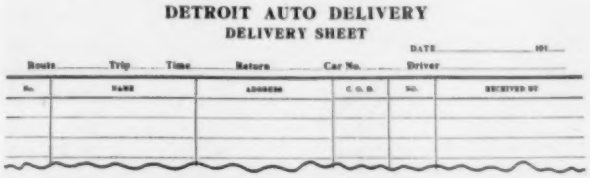
There is a system of pick-ups, that is, of collections of bundles hourly throughout the day. Then, should a customer have something between calls and is in a rush to have it delivered, the package is cared for. The list of those using the service embraces dry goods houses, wholesale drug houses, confectioners, hardware stores, chemists, boot and shoe shops, markets, and the like. These parcels, collected hourly, are transferred to the central station in the heart of the city and there routed according to cars.

Receipt for Bundles Collected

A customer of the company is given a receipt for parcels collected, recorded on the blank, as shown, name of purchaser, residence, number of parcels, and whether or not

Fig. 3. Fleet of Delivery Cars, loaded and about to start out for afternoon trip

they are of the C. O. D. order. This record is kept in duplicate, one for the customer, the other for the delivery company. This makes possible tracing of bundles over which there may be future controversy.


DETROIT AUTO DELIVERY
DELIVERY SHEET

DATE 191

Route Trip Time Return Car No. Driver

No.	NAME	ADDRESS	C. O. D.	NO.	RECEIVED BY

Fig. 4. Duplicate Record Sheet, a copy of which is on file in the office, the other with the driver. Original size, 8½ x 10¾ in.

Sorting or Routing

In Fig. 1 is shown a portion of the interior of the central station, with the bundles lined across the floor. Now, to the uninitiated this would imply chaos, but, on the contrary, it is order, for those bundles as laid out come in rotation in relation to the route. It will be noted that in the background are a series of bins or boxes, arranged according to direction and routes. When the bundles have been put in the bins by the collectors, it is the work of the driver and his jumper to sort them in order. As the bundles are laid out for each driver a duplicate record is made, one copy for the company, the other for the driver. When the sorting has been done the bundles are transferred to the route car and delivery begins. The smaller bundles are, carried in baskets or hampers, arranged in order. The driver has only to glance at his route list to know just where to go.

Duplicate Records

As a matter of record, duplicate copies are made of bundle lists, as shown in an accompanying illustration. It will be noted that the form is ruled off under the headings: trip, route, time, return, car number and driver. The first column bears the heading, "No.," this for the reason that customers are known as numbers, not as individuals, then comes the name of the person for whom the parcel is intended, the address, C. O. D. (this filled in with the amount, if money is to be collected), then the number of parcels to a given address and person, with a blank final space for the signature of the person who receives or signs for the bundle. This affords a tally sheet for collections by drivers and jumpers.

Drivers and Jumpers

The best regulated of delivery systems favors a driver and jumper, and such is the case here. Therefore, there is at the wheel a man who knows his car and is capable of making a roadside repair. During the trip all that he does is to operate the car and receive the C. O. D. collections turned over to him by the jumper. He must have knowledge of the city streets, as must also the jumper. It is surprising how quick this knowledge is acquired. Jumpers and drivers are paired off according to the best interests of harmony. The jumper is a lively individual, as the car, in the course of the day, makes about two hundred stops, the engine hardly ever stopping from the time the car leaves the station until the return from a trip.

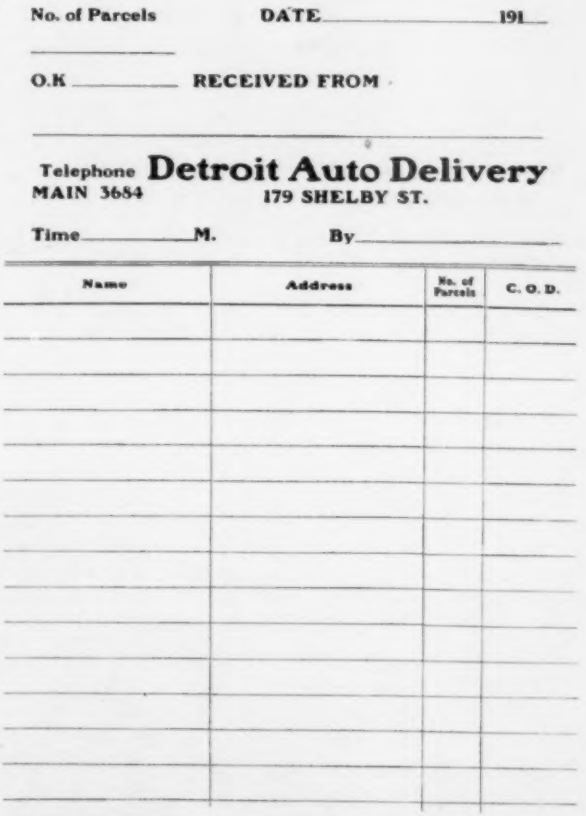
How the Cars Are Arranged

Each of the seven delivery cars is equipped with a four-cylinder, thirty-five horse power motor and a two-speed transmission, maximum speed about thirty-five miles an hour. Tires are pneumatic, in fact, the manager of the company, from his point of view, would not use anything else, since, in this service, speed is essential.

As much work is done after dark, the interior of the car is lighted with dome electric lights, and, to assist the jumper in spotting street numbers, an electric hand torch is carried with a long line of cord, the illumination being almost as much as that of an ordinary headlight. The average load carried is about five hundred pounds, though the cars can transport much heavier loads.

How the System is Regarded

That this system of delivery is well regarded is ostensible from the growth of the business. The manager, in the course of an interview, stated that one customer claims that he has effected a saving which in a year will amount to three thousand dollars, by not making his own deliveries, rather letting the delivery company attend to it. The manager of the company has been long identified with the automobile industry and has extensive knowledge of delivery systems, and knows thoroughly, just what is required by each customer.


No. of Parcels DATE 191

O.K RECEIVED FROM

Telephone MAIN 3684 **Detroit Auto Delivery** 179 SHELBY ST.

Time M. By

Name	Address	No. of Parcels	C. O. D.

Fig. 5. Form Used in Receipting for Bundles Received From Customers. The customer has one, the company the other. Original size, 6 by 8½ in.

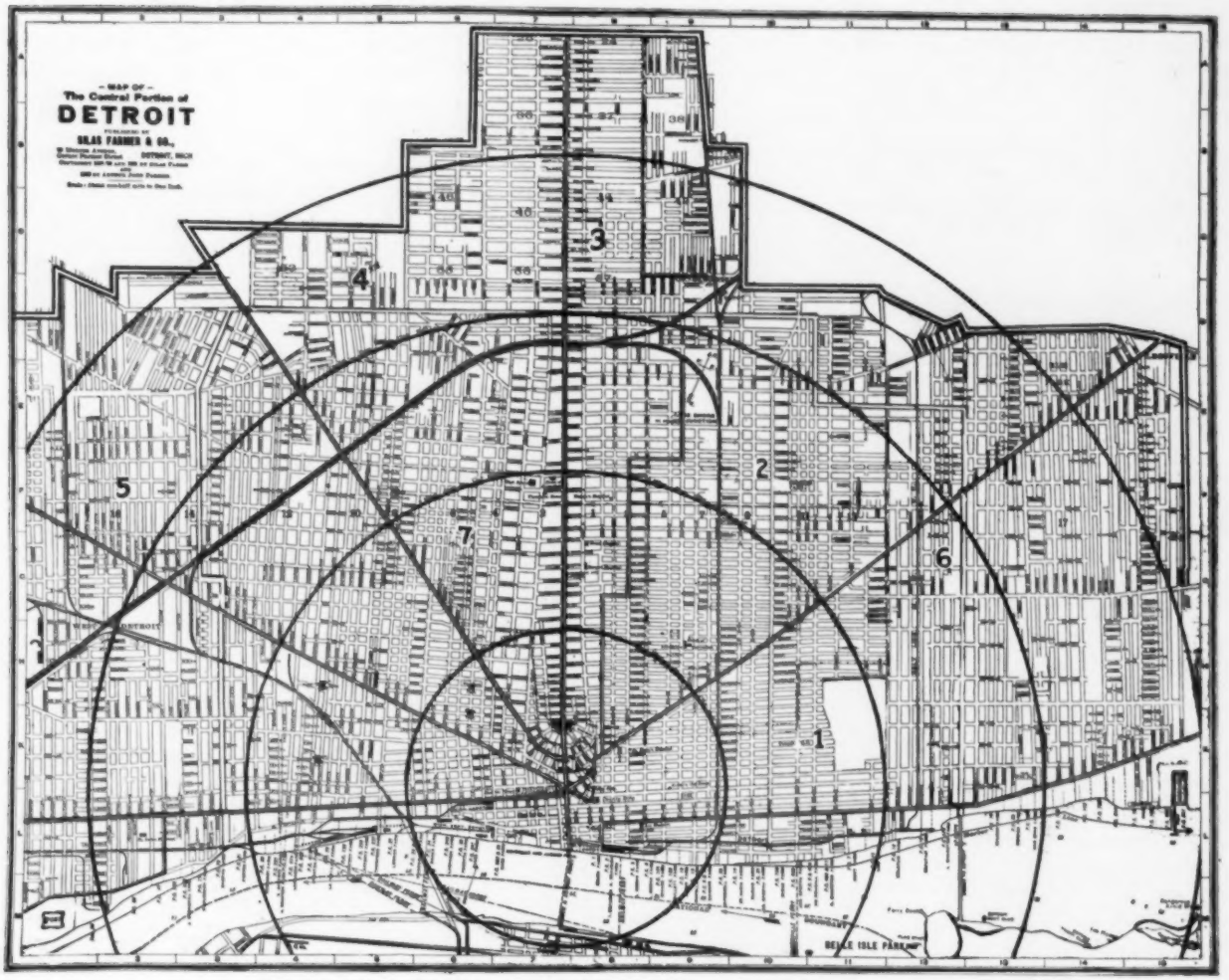
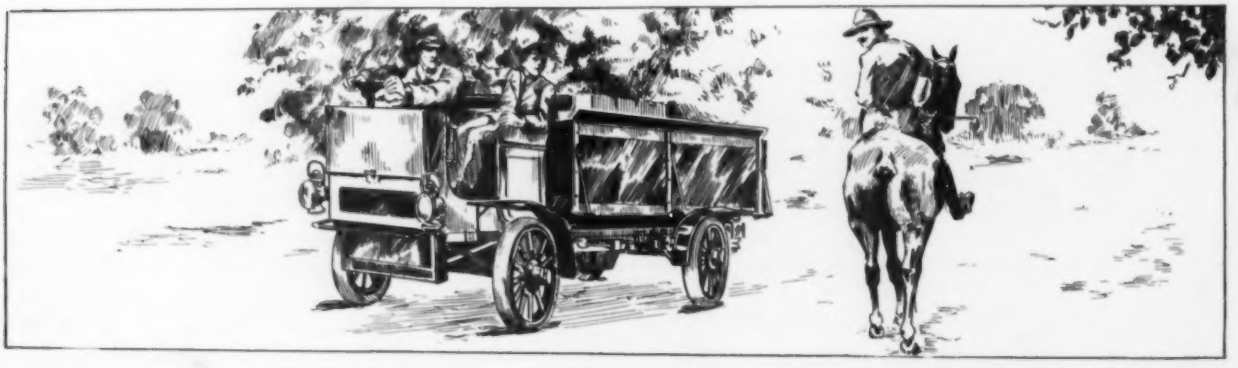


Fig. 6. A Map of the Central Section of Detroit, showing a portion of the ground covered

To meet the needs of those customers having weighty merchandise, a one-ton truck and express vehicles are used. The one advantage of the system to the customer is that the whole fleet may be said to be at his disposal at one time.

Detroit is a city of, approximately, half a million population, and some idea of the ground covered is to be had by reference to the accompanying map. Route 1 is eastward along the river; Route 2 is northeast; Route 3, north; Route 4, northwest; Route 5, west; Route 6, short northeast; Route 7, short northwest. Then there is the Grosse Point special route, sixteen miles each way. The central station, being in the heart of the city, the hub of Detroit, the long routes include five miles out.

The straight heavy lines radiating from the center of hub are the main arteries of travel; the circles are, in order, the 1, 2, 3, 4 and 5 mile radii.



COMPANY FORMED TO MARKET SAURER TRUCKS

An important development on automobile row, Philadelphia, Pa., recently was the opening of an agency for the Saurer commercial truck by the Motor Truck Company, Inc., at 635-37 North Broad Street. The building has a storeroom and repair shop in the rear, with capacity of storing fifteen cars, and accommodations for carrying a complete line of parts.

RAPID MOTOR COMPANY HAS NEW QUARTERS

W. H. Barnes & Son, Spokane representatives of the Rapid Motor Vehicle Company line of commercial cars, have found it necessary to secure larger quarters owing to the increased volume of business this year, and their new garage is a model for convenience and service. The first floor of the building is devoted entirely to the sales and display room and the second story is used for a paint shop. In the basement is a larger space arranged for a garage with every appliance necessary to render quick service to truck users.

UNIVERSAL MOTOR TRUCK COMPANY NOW HAS AGENCIES IN CHICAGO AND BOSTON

A. E. Barker, general manager, and F. R. Bump, sales manager of the Universal Motor Truck Company, were in Chicago recently closing a contract with the McDuffee Automobile Company for the sale of Universal commercial cars in the "Windy City."

The McDuffee Automobile Company is one of the oldest and most favorably known among Chicago dealers. Their building at Twenty-fifth Street and Michigan Boulevard is one of the finest from the standpoint of architecture and the best from the point of equipment on Chicago's automobile row.

Mr. Bump also announces the appointment of W. L. Wilcox, of Boston, Eastern New England dealer for the Universal truck, with headquarters on Boylston Street, although he operates a branch place at Providence, R. I.

NEW YORK DOWN ON SMOKING AUTOS

Taxicab companies of New York City have given their chauffeurs notice that they will no longer pay the fines imposed by city magistrates for smoking automobiles. The New York Taxicab Company is giving its chauffeurs a course of instruction in the art of cleaning automobiles and properly regulating the oil supply.

SELLING TRUCKS DIFFICULT

"Selling commercial cars is a specialty. Pleasure car methods will not always hold good," says F. R. Bump, sales manager of the Universal Motor Truck Company of Detroit.

"There are no fancies to consider, no sentiments to appeal to, no individual members of the family to please. It is a case of figuring dollars and cents saving, and that, too, with a sharp pointed pencil. Furthermore, the successful salesman must be a student of the transportation problem. He must thoroughly acquaint himself with his prospects' particular trucking difficulties before attempting to show that his individual car will fill the bill.

"I was recently talking on this subject with a large milk dealer who told an incident which illustrates the point well.

"A salesman had approached him with the idea of using an expensive motor vehicle to replace the retail route milk carts. After the overzealous salesman had finished a long story of the great advantages of the commercial car, and had sounded the 'death knell' of the horse, the milk dealer pointed out the weakness of his argument in the fact that a horse had sense enough to follow along from house to house while the driver is peddling the milk from one back door to another. On emerging at the far end of the block the driver finds his horse and cart there waiting, while with an automobile he would have to retrace his steps and pick up the automobile, thus losing valuable time."

H. W. Herig, proprietor of the Only Garage on Miami street in Urbana, Ohio, has the agency for the Brush cars in fifteen counties and is general distributor in that territory. He has recently installed an electric light plant in his garage and he is well equipped to do all kinds of repairing. Supplies of all sorts are carried in stock and a livery business is maintained.

Nelson S. Gotshall, well known in automobile circles in Chicago and Minneapolis, takes the place of W. R. Covington, who has just retired from the Krebs-Covington Automobile Company of Denver, Colo., agents for Loziers and Detroit Electrics. A. S. Krebs continues the head of the firm and Mr. Gotshall has charge of the sales. The company has just removed its offices to its new building at No. 741 Broadway.

What is believed to be one of the first garages in the country devoted exclusively to "garaging" for motor trucks, is being built in West Jefferson street, Syracuse, N. Y., by the Chase Motor Truck Company. It will be known as the truck hospital. The great growth of the motor truck business has brought about the need of a garage devoted exclusively to truck repair work.

DEALERS' NOTES

E. W. Bacon has the agency for Wilcox commercial cars in Phoenix, Ariz.

The Agency for the Reo Commercial Car in Middletown, Conn., is in the hands of Charles H. Brewster.

The Kelley Motor Truck Company, of Springfield, Mass., recently opened a branch office in Boston, Mass.

Twenty-five different makes of commercial vehicles are represented in Boston and there are more on the way.

The Nyberg Truck cause in Harrisburg, Pa., is in the hands of C. A. Julius, manager of the West End Garage.

The Coburn Auto Sales Company, of 895 Boylston Street, Brookline, Mass., is the local agent for the Johnson line of commercial cars.

The Automobile Sales Corporation, 142-144 North Broad Street, Philadelphia, Pa., has the agency for the new Peerless line of commercial cars.

The Mogul Motor Truck Company, of Portland, Me., has been incorporated with a capital of $200,000, for the manufacture and sale of automobiles and motor vehicles.

C. F. Fisher, formerly the agent of the Reliance trucks, is now the New England representative of the Gramm Motor Truck Company, with offices at 184 Summer Street, Boston, Mass.

The Mack Motor Truck Company has established an agency in Boston, Mass., at 201 Pleasant Street. Boston now has no less than fifty Mack trucks from one to seven tons capacity.

The Stewart Automobile Company, with headquarters at 231 West Fifty-fourth Street, New York City, has taken the agency for the Mais motor truck for the entire State of New York.

The A. E. Hunter Automobile Company, of San Francisco, Cal., is to have the first Garford agency west of Chicago. The field for selling commercial cars in the West is said to be very fertile.

The Decatur Motor Truck, made by the Decatur Motor Car Company, at Decatur, Ind., is now being handled in Chicago by R. S. Mattoon, general manager of the Lexington Motor Company.

The Standard Motor Car Company, of Los Angeles, Cal., has recently taken the agency for the Federal one-ton commercial car manufactured by the Federal Motor Company, of Detroit, Mich.

The Motor Trucks Company, of Chicago, Ill., has been incorporated by Arthur L. Whitney, William J. Curtis and Raymond Visser for $2500 for the purpose of dealing in and manufacturing commercial cars.

The Hutchinson Motor Car Company, of Hutchinson, Kan., has opened an agency at 114 North St. Francis Ave. Avery commercial cars will be handled. R. A. Nunn is in charge of the sales department.

The Toledo Tire and Repair Company, 241-3 Erie Street, Toledo, O., has secured the general distributing agency for the complete line of Firestone pneumatic, motor truck and carriage tires and rims.

The Kansas City Transportation and Commercial Car Company, of Kansas City, Mo., has been incorporated and will handle the "Adams" line of trucks, manufactured by the Adams Brothers Company, of Findlay, O.

The Park Automobile Company, which has been selling the Chalmers, the Thomas Flyer and the Baker Electric, has added the Morgan truck to its sales room. The first vehicle is a five-ton truck, to be used as a demonstrator.

W. G. Hatch, of San Francisco, Cal., is the western representative of the Chicago Business Car Company. He has sold a number of commercial cars and expects to place local agencies throughout the State in the near future.

The Kelley Motor Truck Company has established a branch in Boston, Mass. It is known as the Eastern Motor Company, and is located in the Shoe and Leather Building, on Ames Street, Cambridge. P. S. Aultman will be in charge

The Mack Motor Truck Company, 12 West Eager street, Baltimore, Md., is now a direct branch of the factory. It will be known as the Mack Brothers' Motor Car Company, and A. F. Mack will be the manager of the local branch.

The Firestone Tire and Rubber Company, of New York, recently moved to 1871-75 Broadway, giving increased facilities which were demanded by the rapid expansion of the business. Special attention is being paid to Sidewire Motor Truck tires and rims.

The Mammoth Garage, of Reading, Pa., formerly conducted by D. B. Hoffer & Sons, has been taken over by the newly organized Mammoth Garage Company. They will take on the agencies for a number of cars and will make a specialty of the commercial car business.

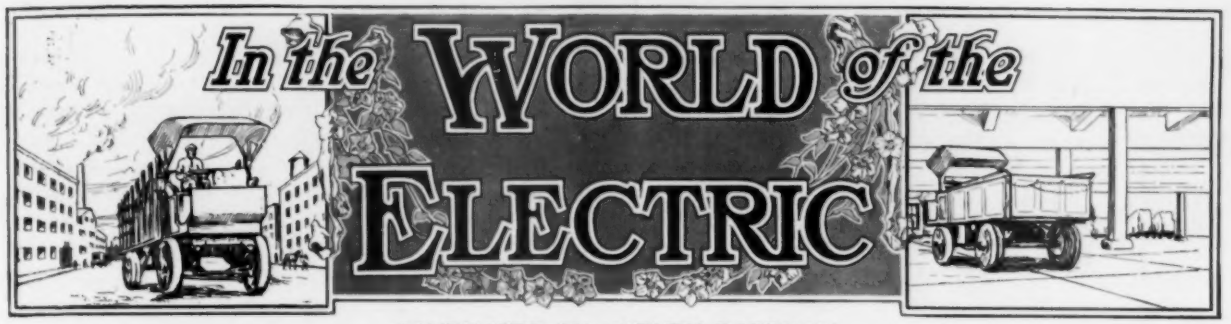
The Capitol City Auto Company, of Hartford, Conn., as soon as its new home at the corner of Allyn and High Streets is completed, will handle a line of motor trucks and light delivery wagons manufactured by the Mitchell-Lewis Motor Company, of Racine, Wis.

The Commercial Motor Company, of Los Angeles, Cal., recently made its first shipment of an order of twenty-five Chase air-cooled motor wagons to the Berlin Dye Works, of the same city. The delivery was featured by a parade of the delivery wagons through the business district led by a band.

The Firestone Tire and Rubber Co., of Akron, O., has appointed Frank H. Martin, previously manager of the Chicago Branch, to be special representative, with headquarters at the factory. A. W. Moore, formerly a city salesman of the Chicago Branch, has been appointed manager, to succeed Mr. Martin.

The Grabowsky Power Wagon Co. has recently opened a New York Branch on Forty-eighth Street, just west of Eighth Avenue. H. L. Ekstein, formerly in charge of the Grabowsky interests in Boston, has been made manager of this branch, which is now the company's eastern headquarters. He is enthusiastic over the facilities.

Walter J. Andrews, a well-known automobile salesman of San Francisco, Cal., has joined the sales force of the J. W. Leavitt Company, of the same city, and will have control of the commercial end of the business. He will handle the Kissel commercial cars and the Overland line of light delivery wagons. His territory will cover the entire Pacific coast.



CONDUCTED BY HARVEY ROBINSON

ELECTRIC VEHICLE ASSOCIATION MEETING

The last meeting of the Electric Vehicle Association of America for the Summer, was held June 27th, at the Engineering Society's Building, New York City. The next meeting will probably be on the 10th of October, the day before the opening of the New York Electrical Show, at which time a large attendance is expected.

The paper of the evening was "Administrative Engineering and Salesmanship in the Commercial Car Field," by William P. Kennedy. In this highly interesting and instructive paper Mr. Kennedy takes the stand that the selling of commercial cars should be taken care of by a well-organized corps of salesmen, backed up by the assistance and coöperation of the engineers of the company. He believes that the engineers should be consulted and brought in to assist in closing the sale.

An interesting discussion of this paper followed, in which it was evident that those representing the sales end objected seriously to Mr. Kennedy's position that the engineers should be consulted or brought in at the finish to assist in closing the sale. The point was made that the salesman should be assisted by the engineering department by means of technical data which might be found necessary, but that the engineer should not be personally called in to assist in closing the sale. The position was also taken that the sale of commercial cars calls for a different type of salesman from those now employed in the sale of pleasure cars, and the new salesman must be an engineering salesman, or, as it was put by one speaker, the commercial car salesman must be a "near engineer" as well as a good salesman.

ELECTRIC AUTOS GROWING IN FAVOR

BY ALBERT WEATHERBY

President Electric Automobile Dealers' Association

It seems that the average prospective buyer of a modern electric automobile, before looking into its merits, does not realize what a different sort of vehicle the electric of to-day is when compared with the models of the days when the electric car was first put on the market on a substantial scale. He does not stop to think that years of experience have brought about such marked evolution and improvement in this type that the efficiency of an electric carriage or an electric commercial vehicle is nothing short of remarkable nowadays. The motorist recalls models of a decade back which carried a couple of tons of storage battery around on four wheels at scarcely better than an overgrown snail's pace, and perhaps he is under the false impression that the 1911 models are much the same.

Nine years ago, when the gasoline car was struggling for recognition, salesmen of electric car makers used to make all sorts of rash promises and claims for their product, especially the mileage it would make on a single battery charge. It almost invariably happened that the cars would fall decidedly short of these claims and as a result the pleasure electric lost its prestige to some extent.

There were reasons for this unfortunate condition existing then, notably the unimproved forms of battery and the somewhat crude electric motors. The battery maker would guarantee what was considered great mileage in those days—say forty miles on a charge—and the battery would move the chassis twenty-five miles and then "drop dead." Then, too, it must be borne in mind that in those days garage men, users, and even manufacturers, did not know how to care for batteries properly.

Because of the lack of speed of the early electric models, these were never put into competition with gasoline cars to secure publicity. The average person does not realize that electric vehicles are to-day perfectly capable of making creditable showings in endurance and economy tests. There are numerous makes of electric cars which can run more than one hundred miles on a single charge at an average speed of eighteen miles an hour or better. Obviously, the electric never was intended for high-speed, cup-race work, aside from one or two "freaks" built some years ago; however, everybody is not speed crazy. The majority are satisfied to average eighteen to twenty miles an hour in ordinary running.

It is to woman that the electric pleasure vehicle owes its marked development. Had this type not appealed to feminine fancy, because of its simplicity and cleanliness, the electric would never have become popular. The woman of moderate income has found that she can afford an electric, which she can pilot herself, whereas a gasoline car, requiring the expense of a chauffeur, is in many cases prohibitive.

As far as commercial vehicles are concerned, so many mercantile houses employ these that their efficiency and ability is universally known.

Electric vehicles have a great future before them for the utilitarian purposes of cities, because the great majority of such service comes within the limits of fifty miles or so, for passenger vehicles and thirty miles for commercial vehicles. The hauling of tons of merchandise on a truck from a store to a railroad freight station, the doctor making his round of calls, the transportation of a theater party in a cab to and from the theater, and the gadding about of Madam on a shopping or calling tour, in brougham or victoria, are examples of utilitarian service. The suitability of electricity for this service is unequaled, and one has only to recall the properties of the electric motor and of the electric storage battery to understand why

Waverley Electric Commercial Cars

BY WILLIAM J. JOHNSON

WAVERLEY electric commercial cars, manufactured by the Waverley Company, at Indianapolis, Ind., are offered in three types of chassis ranging from light delivery to three-ton trucks. The larger car represents the latest Waverley practice, therefore sure to prove the more interesting to those who are at all concerned with this method of merchandise transportation. Under three tons load capacity the vehicles follow the same general design and construction, while in the three-ton car, the increased weight to be carried naturally deems a modification of design expedient. This large Waverley car differs from contemporary makes in that it is equipped with two motors instead of one. The Waverley Company has had long experience in the production of commercial electrics and if deviations are made from what has come to be regarded as standard, surely there is some good reason for it.

A Few Types of Waverley Bodies

In the smaller Waverley models a single motor is used, drive through double side chains, except in the case of the light delivery car, which is equipped with a shaft drive, not unlike that featured in the well-known Waverley pleasure electrics. As the three-ton commercial car is the latest Waverley creation, it is given preference here.

Channel-Steel Frame

The frame of the three-ton commercial car is made of channel steel, is 15 ft. long and 4 ft. 3½ in. wide, 5 in. channels, 6½ lb. section. The member is hot-riveted throughout and at the rear is fitted with heavy gusset plates; flanges are 1¾ in. wide. The front and rear cross members are 6 in. deep, others are 5 and 3 in. deep. The side rails are continued beyond the rear cross member, to meet the requirements of purchasers who desire longer bodies; should smaller be wanted, the overhang or additional length can be cut away. With six cross members the main frame is firmly braced.

Wheel base is 117⅞ in., tread 73 in. The wheels are wood, artillery type, with 3½ in. dual tires fitted at the rear and 6 in. single forward.

The axles are drop-forged alloy steel, the wheel pivots being ground and fitted with Timken roller bearings. The front member is rectangular in design, 3 x 1¾ in.; the rear also rectangular, 3½ x 1¾ in. The steering yokes are forged integral with the front axle.

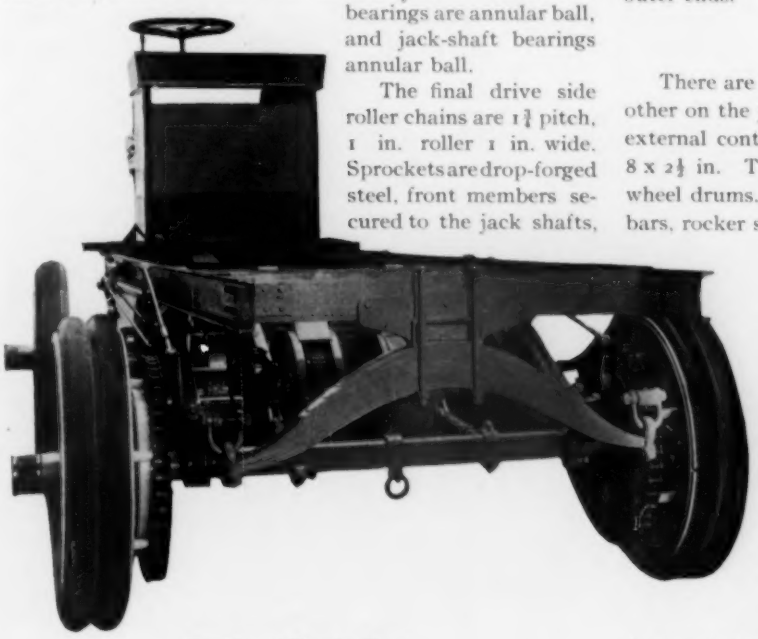
Double Motor Equipment

As above noted, the double motor equipment is favored in this three-ton Waverley commercial electric, each unit series-wound, 80 volts, supported to the frame sides in heavy cast-steel brackets, which also carry the jack-shaft bearings and brakes. Drive from each motor to the countershaft is through a Renold silent chain, final drive through side roller chains.

Waverley motors are built complete in the company's own plant, so that consistent performance may reasonably be expected. Primary drive chains are enclosed in metal cases fitted with hand plates, which may be removed when desired. The jack shafts are supported in cast-steel brackets inboard, these in turn being secured to a cross member of

the frame. Radius rods extend from the rear axle to the jack shafts, and these are provided with turnbuckles, so that chain adjustment is a simple matter. Similar members reach from the rear axle to the outer ends of the jack shafts, so that there is a double provision for adjustment and the maintenance of positive alignment under all load strains. These distance rods are 1 in. in diameter. The motor bearings are annular ball, and jack-shaft bearings annular ball.

The final drive side roller chains are 1¾ pitch, 1 in. roller 1 in. wide. Sprockets are drop-forged steel, front members secured to the jack shafts, rear members to the sprocket rings clipped to the rear wheels spokes through twelve ⅜ in. steel clips.



Rear View of Waverley Chassis

Edison Battery

The Edison battery is used, if desired, in the Waverley three-ton commercial car, or, when so desired, the Exide type will be fitted. The battery box is wood, carried amidships between two cross members of the frame, supported through strap steel hangers riveted to the frame sides. Cables are led through wood ducts along the top of the battery box to the motor.

Springs

Front springs are semi-elliptic, while at the rear the platform type is used. A special spring steel is employed in the construction, the members built up of a number of thin graded leaves. The front springs are anchored either end to cast-steel brackets on the frame side rails and clipped to the front axle through steel clips. The rear side sets are held forward in frame side brackets, clipped center to the rear axle and bearing in free-action hangers to the ends of the transverse member. Side sets are 44 in. long, carried under the frame rails. Front sets are 44 in. long also. The cross set is anchored to the rear frame cross member through steel clips bearing in the rear ends of the side sets at the outer ends.

Brakes

There are two sets of brakes, one in the rear wheels, the other on the jack or countershaft, both foot-operated. The external contracting members are on the jack shaft, these 8 x 2½ in. The internal expanding brakes are in the rear wheel drums. Brake action is imparted through ½ in. pull bars, rocker shaft being 1½ in. in diameter.

Controller

The Waverley three-ton electric commercial car controller is of the continuous torque knife-blade type, no interruption or break in the current in advancing from one speed to another. This is located under the driver's seat, worked through a vertical rubber-handled lever, which may be locked in position, obviating tampering.

Steering

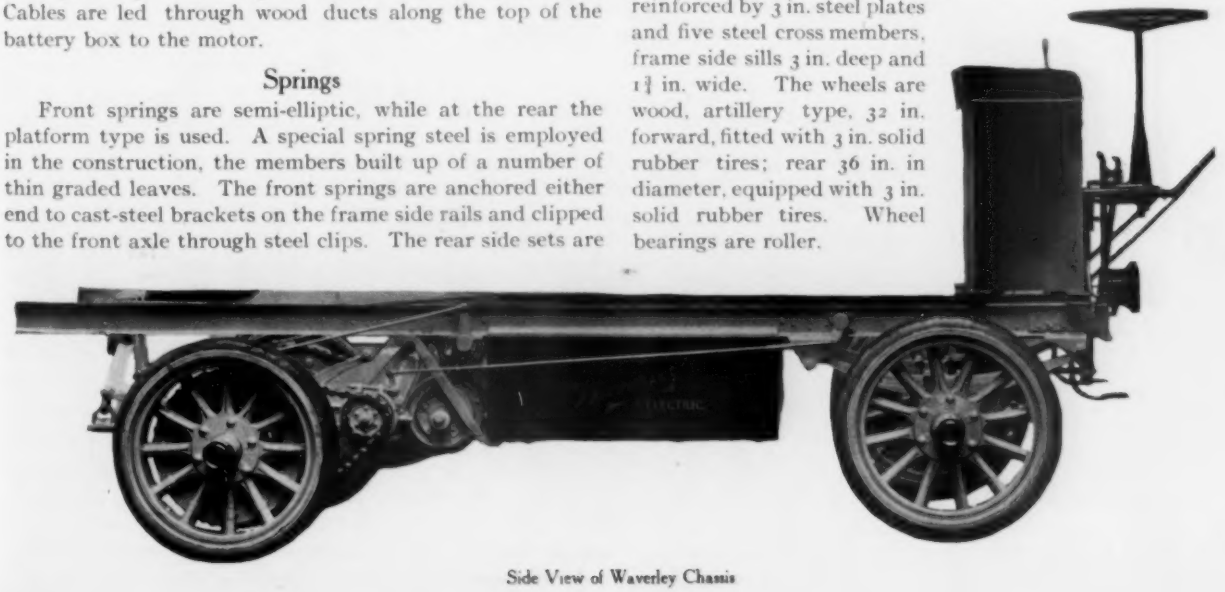
A sector and pinion form of steering gear is used, with a case cast of steel. The vertical steering post is 1¼ in. in diameter, fitted with a 24 in. hand wheel, and is supported in a conical-shaped bracket on the floorboard. The steering cross rod is 1¼ in. in diameter; this a solid steel bar carried forward of the axle.

Bodies

Several types of bodies are to be fitted, at the option of the purchaser, the loading space back of the driver's seat being 13½ ft.

The Fifteen Hundred Pound Waverley

The fifteen hundred pound Waverley is typical of the lighter construction. This is fitted with a wood frame, reinforced by 3 in. steel plates and five steel cross members, frame side sills 3 in. deep and 1¾ in. wide. The wheels are wood, artillery type, 32 in. forward, fitted with 3 in. solid rubber tires; rear 36 in. in diameter, equipped with 3 in. solid rubber tires. Wheel bearings are roller.



Side View of Waverley Chassis

Springs

The front springs are semi-elliptic, rear three-quarter elliptic. Forward sets have ten leaves, are 40 x 2 in., clipped to the front axle and anchored front and rear to drop-forged steel hangers, rear end shackles flat plate type. The rear sets are secured to the rear axle, forward, in cast-steel brackets on the frame sides, rear anchorage at the ends of the upper sections to cast-steel brackets through four ½ in. steel clips. Forward spring clips are also ½ in. in diameter.

Continuous Torque Knife-Blade Controller

The bottom sections of the rear springs have nine leaves, are 2 in. wide, 40 in. long; top sets have eight leaves 2 in. wide and are 23 in. long.

The front axle is tubular steel, 2½ in. in diameter, fitted with drop-forged steel yokes. The rear member is round section, 2⅜ in. in diameter, made of a special alloy steel.

Single Motor

In the lighter Waverley cars, as before mentioned, the single motor is used, this being of the company's own make and design, series wound. The prime mover is fastened to a 1 in. cross bar extending from one frame rail to the other. Integral with the end plates of the motor are the supporting brackets. Drive from motor to countershaft is through a Renold silent chain 2 in. wide, countershaft being 1¼ in. in diameter. This latter is supported outboard in cast-steel brackets secured to the frame side rails. Chain adjustment is made through 1 in. distance rods. The final drive is through double roller side chains, ⅝ in. roller, 1 in. pitch. The front sprockets are secured to the jack shaft, rear to the wheel sprocket rings.

Battery

Either Edison or Exide batteries are to be had, the Edison equipment being sixty-six cells of A4 or forty-eight cells of A6. The Exide battery is furnished in forty-two cells of 11 M.V. type.

Brakes

There are two sets of brakes on countershaft and rear wheels. Both sets are operated by foot pedals, countershaft pedal at the left, rear wheel brake pedal at the right. The brake rocker shaft is 1 in. in diameter, supported in brackets at the rear of the battery box and to the frame sides. The action is through adjustable steel pull bars. The countershaft brakes are 1½ x 8 in. contracting type, rear wheel members being of the internal expanding type.

Steering

The car is steered from the left, which makes it especially handy for city service; steering post is 1¾ in., hand wheel is 14 in. The steering system is of the sector and pinion type, case of cast steel. Steering cross connection is ¾ in. in diameter in front of the axle, yokes bushed with bronze. The drag link is fitted with ball and socket joints.

Safety Controller

All Waverley commercial cars are fitted with a safety type of continuous torque controller, and in this model, as in the three-ton car, it is carried under the driver's seat and worked through a hand side lever. It is rendered positive as a safety device by an auxiliary lever, shown in the accompanying illustration. This auxiliary lever is fitted with a flat key, which must be in position when it is desired to advance the controller handle proper to pass through the various speeds. There are five of these forward speeds which are made by advancing the lever forward. For the reverse the lever is advanced in like manner, but in order to do this the safety lever must be advanced to the forward stop. A lock is also fitted, which is purely mechanical, having nothing whatever to do with the current. When the car is idle, unoccupied, it cannot be started unless this key is in place.

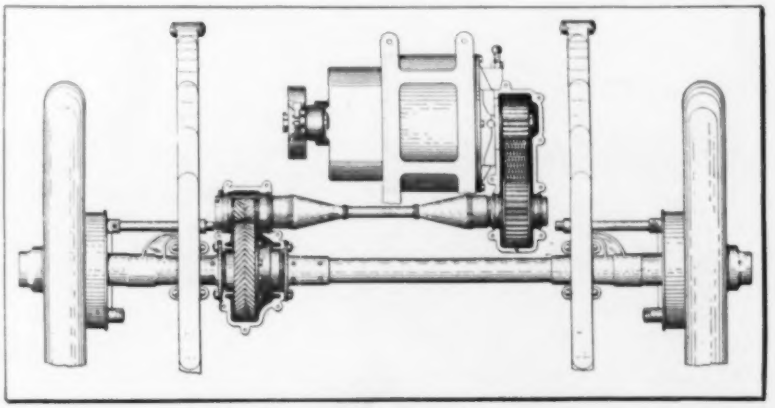
Bodies

The fifteen hundred pound load capacity Waverley commercial car is well adapted for many types of bodies, the price varying according to the body equipment. When fitted with a panel type the inside carrying space is 7 ft. x 3 ft. 4 in., height 4 ft. 8 in.

The wheel base is 97½ in. A combined volt and ammeter is fitted. The battery is carried in a wooden box or compartment, located amidships of the chassis in order to effect equal weight distribution. As in the larger commercial cars, this battery compartment is firmly braced.

The Shaft-Driven Waverley

Of the smaller Waverley electric commercial cars the shaft-driven model is interesting. This, in a sense, has



Plan of Rear Axle and Driving Mechanism

about the same power plant that has been successfully employed in the pleasure cars. Final drive here is through a universal-jointed horizontal shaft, transversely placed, to the live rear axle.

The frame of the vehicle is reinforced with gusset plates at the corners, as well as by the usual cross members, which are of pressed steel. To these cross members the power plant is attached. To clear the motor these cross pieces are center-dropped. Frame side rails are 2¼ x 2 in.

Motor

The series-wound motor has formed integral with the field ring an H-shaped supporting bracket, the motor through these being secured to the cross members of the frame with ½ in. steel bolts. At the right extension of the armature shaft there is attached a pinion; at the left side, the armature shaft brake. Pinion meshes with a Renold silent chain, which transmits the power of the motor to the ¾ in. driving shaft fitted with two universal joints. At the right end of the shaft is a large sprocket, which meshes with the silent chain. This entire driving mechanism is enclosed in a dirt-proof case and is oiltight. The live axle is enclosed in a steel tube, the sole function of which is to support the load at the rear. Thus the live axle is free to drive the car. The live driving members are squared on the inner ends where they enter the differential. The working of this construction is shown in the accompanying detailed drawing. The rear axle tube is 2 in. in diameter. To strengthen the rear construction a 9-16 in. adjustable stay rod is fitted.

Waverley Electric Loaded

Springs

Front and rear springs are full elliptic, front members 37 x 1¾ in., five leaves, clips 7-16 in. in diameter. Rear springs are 39 x 1¾ in., six leaves, clips 7-16 in. in diameter. To further improve the spring suspension a 32 in. cross member is fitted just back of the battery box, this set having four leaves 1½ in. wide. Thus there is increased spring resistance at a point where it is very likely to be needed.

Brakes

There are two sets of brakes, armature shaft member on the left side being contracting band type, 1½ x 6 in. The rear members are internal expanding type, 12 x 2 in., action through foot pedal and steel pull bar. Brake cam levers in the rear wheel assembly are ¾ in. in diameter.

Steering

Steering in this model is from the left, a worm and sector gear being used. Steering rods are ¾ in. in diameter, with ball and socket joints.

Underslung Battery

The battery here is also of the underslung type, so placed as to divide the weight equally. Edison or Exide equipment is to be had as ordered, the price of the car governed accordingly. A combined volt and ammeter is part of the regular equipment. The battery box is supported on the frame through steel straps 1½ x ½ in. The road clearance is 10 in.

Wheels are wood, artillery type, 32 in. in diameter, with 2½ in solid rubber tires front and rear.

When so ordered this car is to be had with pneumatic tires. Wheel base is 87 in.; length over all, 125 in. Carrying capacity is 600 lbs, and the speed 15 m.p.h. The usual battery performance is 50 to 80 miles on a single charge. The equipment includes side and tail lights, storm front and side curtains. The price of the standard car is $1800, with the Exide, Waverley or National battery equipment.

The special model of this type is to be had for $2280, which includes a forty-eight cell Edison battery, with which the carrying capacity is rated at one thousand pounds. The same mileage is claimed for a single battery charge as with the standard equipment. All prices are f.o.b. factory, Indianapolis, Ind.

Manager C. F. Redden, of the Studebaker Company, states that his company has shipped a three and a half ton Studekaber electric truck to Malmo, Sweden, to be used in the flour-milling business. The export business of the Studebaker Company for automobiles, trucks and horse-drawn vehicles has grown to such an extent that they have been compelled to establish an export department at 11 Broadway, New York, under the supervision of John P. Roberts.

The Fritchle Motor Truck Company is to move its factory from Denver to Kansas City. Deals are pending for a site in the latter city. The factory will employ about two hundred men at first and President Fritchle expects to increase that number very shortly after the factory is in working order. At least one hundred trucks will be turned out in the first few months. The Fritchle trucks carry from one thousand lbs. up to five tons.

Do not forget to enter your cars in the National Efficiency and Economy Contest. See page three of this issue.

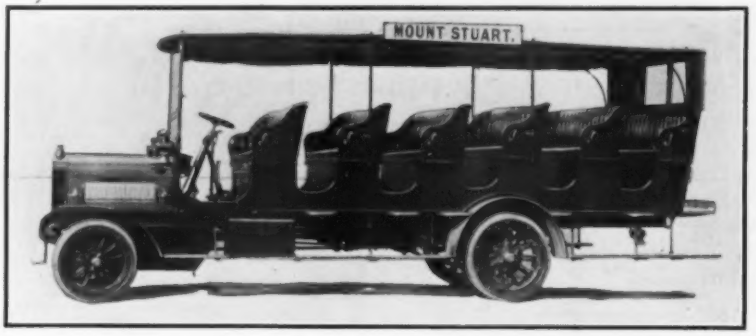
Leading British Trucks—The Halley

FRANK PALMER

THE Halley Truck is among the very few built throughout by people who have never attempted to make or sell pleasure chasses, and, having solely confined attention to commercial wagons, are fairly entitled to a position in line with the leaders in this particular branch of the automobile industry. Singularly enough, the earlier patterns, right down to the end of 1909, were constructed with propeller-shaft and worm-drive transmission, but all models are now made with side driving chains.

Frame

The pressed-steel side members of the frame follow standard design, as to shape, but differ materially in the setting of the top and bottom flanges, these being placed on the outside; an arrangement hardly providing a very neat finish, as all the rivets and bolt heads to attach engine and other parts are exposed to view. The object of this departure from customary practice is to facilitate work in the factory, the necessary hole drilling being done with more certainty and exactness when men are able to move about comfortably on the outside of the chassis rather than trying to proceed with the operations while standing in a cramped space between the fixed side and cross members. A slight amount of insweeping is given from the rear of the driver's seat to an inch or two beyond the dashboard, though it is hardly noticeable until looked at from the front end of the frame, before the dash is attached. The rear ends are left open, while the front ends are bent downwards for forming dumb irons to attach the fixed eyes of the half-elliptic springs. Five cross members are fitted, viz., one pressed steel, across the front, on which rests the radiator; one immediately behind for supporting the engine, and three at equal distances behind the seats; the latter composed of I-beam section, strengthened by gusset pieces where the side members are joined. The depth of the webs and width of flange are the same for the various models, the thickness of material varying from 3-16 in., in the two-ton capacity, up to 5-16 in. for the five-ton vehicle. All holes are reamed out true to size after drilling, and wherever bolts are employed these are turned to gage from high-quality steel.



The 40 H. P. Halley Char-a-banc. Note the long overhang and luggage carrier

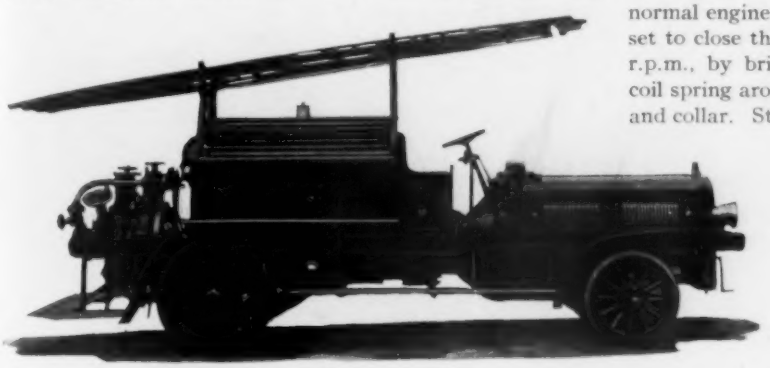
Engine

Five types of engine are constructed, viz., two-cylinder, 16 h.p., 4½ in. bore, 5 in. stroke; two-cylinder, 20 h.p., 5 in. bore, 5¼ in. stroke; four-cylinder, 34 h.p., 4½ in. bore, 5¼ in. stroke; four-cylinder, 40 h.p., 5 in. bore, 5¼ in. stroke, and six-cylinder 60 h.p., 5 in. bore, 5¼ in. stroke, all with the same general features and differing only in the dimensions. The cylinders are cast separately, with valves on opposite sides, the valves being fitted in detachable bushings, while the springs are retained by large collars at the top and bottom. Each valve cap fits on to a machined seat and is held down by separate cross heads and retained by studs and nuts on either side of the valve chambers.

Bearings are placed between each throw of the crankshaft for both two-cylinder and four-cylinder models, these bearings being bushed with phosphor-bronze, while those for the crank pin ends of the connecting rod are lined with white metal. The cams are machined integral with their shafts and are unusually large, this feature of size being apparent everywhere throughout the engine. A peculiar form of adjuster is provided at the tappet rod heads, a threaded extension being rotated by a tommy bar for the purpose and locked by a nut at the base; the general plan of fixing such adjusters by one nut and locking with another does not permit extremely fine adjustment, as the act of tightening the locking nut sufficiently tends to lengthen the set distance between tappet head and valve stem.

The completely enclosed timing gears at the front end also actuate the high-tenison magneto at one side and the centrifugal water pump at the other, the latter looking

large enough for an engine double the power. The makers of the Halley lay stress upon the fact that their engines never overheat, even if running under the awfully severe conditions involved by constantly moving the vehicle along congested streets in a city; the big ribbon-tube



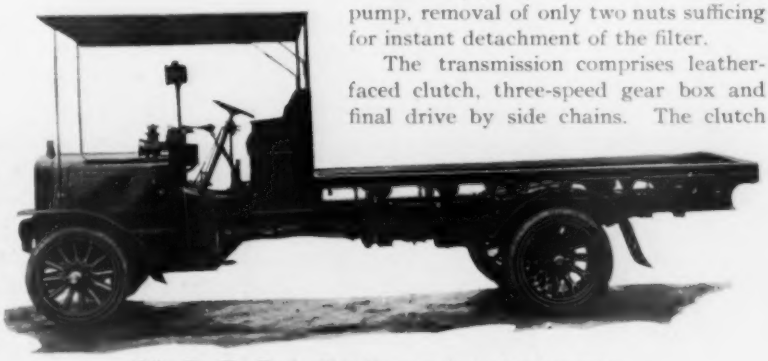
The Halley 60 H. P. Fire Engine, with rotary pump at the rear

type of radiator also helps in this direction in conjunction with the flat belt driven fan. In designing the water circulating system, much thought has been devoted to giving the copper pipes as wide radius bends as possible and drainage taps for each cylinder jacket, at the base of the radiator, below the pump, and from the connecting pipe between radiator and pump, this pipe being purposely carried some inches lower than the pump to ensure every drop of water being drained away when the vehicle is put away over night during frosts in winter. (Anti-freezing solutions are so rarely called for in England that few users go to the trouble of mixing same with the water, so good designers fit the alternative of ample supply of drain taps.) All pipes attached to the engine have flush-faced flat joints, retained by bolts and nuts, this plan, after trial of other devices, having proved most satisfactory for attention by unskilled drivers. The firm's own make of carburetor has been hitherto fitted, but it is pretty certain that the Zenith Carburetor, having a separate jet for starting up and slow running, will be standard in future.

A butterfly throttle is controlled from a hand lever attached to the steering column, which, in its turn, is controlled by a centrifugal governor exactly similar to the style fitted to the cut-off of steam engines. Its vertical shaft is rotated by an enclosed worm gear from the tail end of the cam shaft, an upward extension also serving to drive the contact maker for the accumulator coil ignition. The normal engine speed is 850 r.p.m., and the governor can be set to close the throttle at this speed or up to about 1,000 r.p.m., by bringing together more closely the turns of a coil spring around the governor shaft, with the aid of a nut and collar. Starting up on the magneto ignition is rendered quite easy, because there is fitted in front of the radiator a lever for giving half compression through the agency of a sliding exhaust cam shaft.

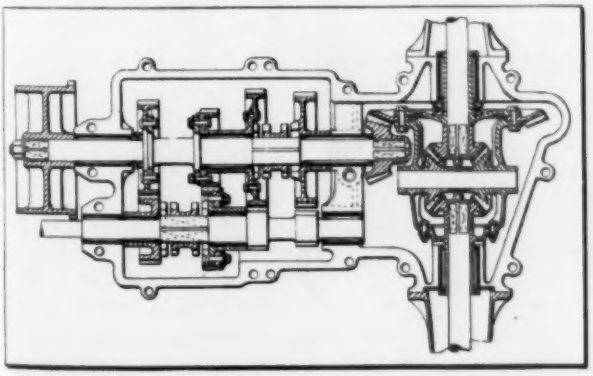
Engine lubrication is entirely automatic, a gear-driven plunger pump, on the exterior of the crank case, drawing from a sump and delivering under pressure to the crankshaft bearings, and also to the crankpin bearings along passages drilled through the crankshaft. A by-pass conveys a small quantity of oil up to a glass-faced indicator on the dashboard, the outlet pipe from this returning oil to the sump. A very simple form of oil filter consists of a finger-shaped piece of fine mesh copper gauze that fits into the end of the pipe between crank case and pump, removal of only two nuts sufficing for instant detachment of the filter.

The transmission comprises leather-faced clutch, three-speed gear box and final drive by side chains. The clutch



Halley Five-Ton Truck. Note the awning for the driver's protection

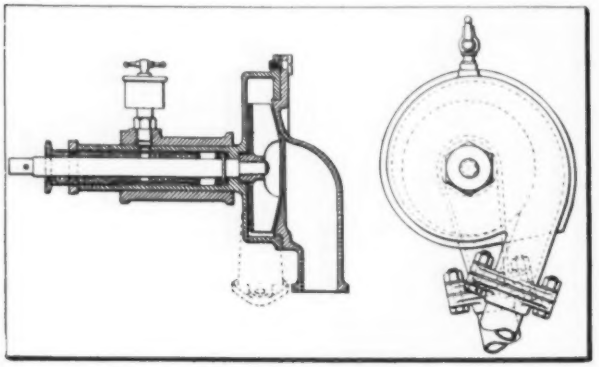
fork bridle is continuously lubricated from a sightfeed drip glass on top of the dashboard, a flexible length of patented metallic tubing allowing for the to-and-fro motion of the clutch. The clutch spring, which is coiled around the clutch shaft, can be tightened or adjusted very quickly by sliding back a plate, which exposes large-diameter hexagon nuts, drilled with holes on the flats, so that a tommy bar, or similar tool, will do all that is needful. A clutch spring does not usually require adjusting very frequently, still it is a job that nobody likes when the nuts have to be manipulated by some special tool, or when the nuts are inaccessibly placed. It may be here stated that so very many commercial wagons are now purchased only upon the advice of consulting engineers that attention to details which make for quick adjustment and general accessibility must receive consideration from manufacturers, now that the lines of design in different makes are so much alike.



Halley Three-Speed Gear Box, Bevel Gear and Differential. Note the foot brake at the front of the gear box

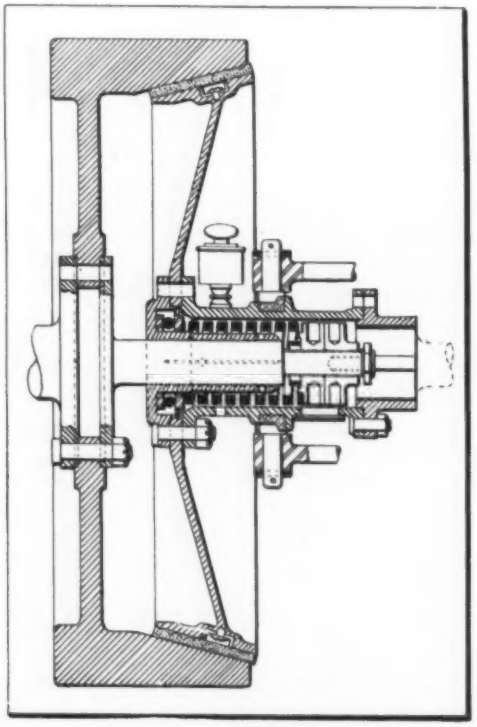
As the gear box is situated some distance away, there is plenty of room for fitting a metal enclosed universal joint. The gear box provides three forward speeds with direct drive on top, the gear changes being effected from a gate side lever to the "always-in-mesh" type of spur wheels, dog-tooth clutches offering sweet and easy motion, whether

changing up or changing down. Gear shafts all revolve in large diameter plain bronze bearings. The pedal actuated brake consists of a drum placed peculiarly at the front end of the gear box upon the secondary shaft, and this is about the only feature calling for criticism on the chassis. The available space is so restricted that the diameter of the brake drum is far too small, and, though it is attempted to



Halley Water Circulating Pump

overcome the trouble by making the drum very wide, it is certainly not the sort of thing to imitate. By a slight alteration in the design, viz., bringing the gear box more forward in the chassis, so as to have a short shaft intervening between box and differential, there would then be plenty of room for a really large brake.



Halley Leather-Faced Cone Clutch, with adjustable engaging spring tension

The dog clutch change gear devices in the box are actuated from a side lever, working in a gate, an arrangement somewhat unusual for the type; the selectors are situated immediately below the lever, whence a couple of rods are taken through the side of the box, one controlling the reverse and lowest gear, while the other actuates the second and top gears. Rear brakes are internal expansion, and for all sizes of chassis twin solid rubber tires are fitted to rear wheels. Ground clearance below lowest point of machine and road is 12 in. for two-ton models, and 13 in. for the larger vehicles. Wheel sizes are 32 in. front and 34 in. rear for two, three and four-ton capacity; for five and six-ton sizes, are 34 in. front, and 40 in. rear. But one size fuel tank is supplied for all models, viz., fifteen gallons capacity, situated beneath driver's seat, and feeding by gravity, through a filter with draw-off tap that is placed under the floor boards.

A most important feature is the ample provision of screw-down greasers, and in no chassis the writer has inspected, pleasure or commercial, have better arrangements been made for the purpose. On the exterior of each wheel hub, projecting at an angle, are a couple of greasers, while similar ores are attached to steering heads, all steering-rod connections, steering-gear box, clutch shaft, spring shackle pins at each corner, fan shaft, water-pump shaft, universal joints, joints of rods between gear-shifting lever and gear box, brake-rod joints, and, in fact, throughout the chassis all places needing lubrication are normally left with open oil holes.

COMMERCIAL CARS POPULAR IN PARIS

Statistics compiled on the number of commercial cars in the city of Paris show there are now 1095 motor trucks and delivery wagons in use there, and about 3000 taxicabs. In addition, there are several score pieces of motor-driven fire apparatus and a number of motor-driven street sweepers and sprinklers, all of which must be converted into motor-driven types whitin a period of four years.

The freight and merchandise carrying commercial motor vehicles in Paris are divided as follows:

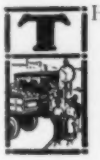
Useful loads from 1,760 to 4,000 lbs.	234
Loads of from two to five tons	179
Useful loads of five tons and over	143
Other commercial cars	120
Motor-driven 'buses	203
Cars in postal service, 1,700 to 2,600 lbs.	156
Tractors and road locomotives	60
Total number in use	1,095

From the above list it will be seen that practically one-third of the vehicles listed are of more than two tons capacity, and the surprising thing is in the large number of tractors, road trains and road locomotives in use.

THE AUSTRIAN WAR DEPARTMENT has perfected plans which will result in its having 268 motor trucks at its disposal at the end of five years. The sum of $400,000 has been appropriated for the subsidy of business machines of five-ton rating, drawing trailers. The owners of such units are entitled to a subsidy of $800 in the first year of the subvention period and $200 for the balance of the period. The maximum speed of the units is fixed at fourteen miles an hour. When the machines are required for maneuvers lasting from two to three weeks the compensation will be $8 a day per machine.

The Motor Cab

BY OUR FOREIGN CORRESPONDENT



THE commercial car is, generally speaking, a specialized product, and will tend more and more towards specialized design and manufacture. The one "exception which proves the rule" to this law of specializing is at present the motor cab. It is only during the last four years that this branch has made such strides in London, although there had naturally been much experimental work before that. In the earlier stages, naturally, the cab in Great Britain was simply a pleasure chassis slightly altered, and even now there is very little difference in design between the majority of them and the ordinary moderate powered private car. The principal modification, required to come within the police regulations, is found in the steering, which has to give sufficient lock to enable the cab to be turned in a circle of twenty-five feet diameter. When this regulation was first introduced it was prophesied that compliance therewith would be impossible, but in this matter the prophets have been stultified, and the cabs rendered wonderfully handy in traffic, though it must be admitted that the action of the steering wheels is very far from perfect when the full lock is applied; the cab is then wrenched, rather than turned, around. The other police regulations have reference chiefly to body requirements, and have led to nothing different from ordinary car practice.

At present the taxicab has been in use on a large scale for such a short time that it is impossible to foretell the lines along which permanent development will go. It cannot be doubted that the use of what is practically a pleasure car chassis for continuous hard work is doubtful, and that it might be desirable to make certain parts, especially the transmission gear and brake arrangements, more substantial. But in saying this, one must recollect that a point is reached when the increased durability gained by larger bearing surfaces and more substantial construction increases the weight, and the extra tire wear and gasoline consumption, to such an extent that finally nothing is saved in the running cost. With pneumatic tires the weight question is of special interest, although it is an open question whether weight may not be overestimated as an influence in tire wear; and for this reason: When a car is driven roughly over bad roads it has a tendency to jump, and this point is the more accentuated in the lighter car. The result is that in some very light cars, under such conditions, we get quite undue tire wear, owing to the fact that when the wheels jump their speed is free to increase, and on touching the ground again this extra speed is suddenly checked by friction against the road surface, resulting obviously in tire wear. The argument, of course, applies only to the driving wheels.

To give some idea of the growth of the motor cab in the British capital, let us quote the following police statistics showing the number of motor cabs licensed year by year to ply on the London streets:

	Motor	Horse	Total
Dec. 31st, 1904	2	11,057	11,059
Dec. 31st, 1905	19	10,931	10,950
Dec. 31st, 1906	96	10,492	10,588
Dec. 31st, 1907	723	9,818	10,541
Dec 31st, 1908	2,805	8,475	11,280
Dec. 31st, 1909	3,956	6,562	10,518
Dec. 30th, 1910	6,336	4,701	11,037

Thus, last year, for the first time, the automobile outnumbered the horse cab; and though the latter is dying hard, it will soon be little more than a curio, unless, indeed, a few are kept on specially for the use of ultranervous old women. This is quite possible, as the horse-drawn vehicle still has its own distinct *clientele*, made up mostly of old ladies with delicate nerves.

In the provinces away from London the motor cab has also made considerable advance, but nothing like that experienced in London. Generally speaking, the cars in other cities and towns more nearly approach the private car, though they are mostly larger, and with longer wheel bases are more suggestive of the privately owned landaulet.

For some time past the cab industry in that country has been face to face with an awkward development. The fact is that competition has led to a struggle in luxury; a struggle which threatens to go further than reasonable competition, and to promise quite serious damage to the business. This fight has taken the line of increased power and increased luxury. The two have gone hand in hand, and none of the knowing public nowadays will take a two-cylinder cab when they can get one with four cylinders. The early taxicabs usually had two cylinders about 75mm. x 120mm. bore and stroke respectively (3 x 4¾ in.), while four-cylindered machines usually have 80mm. bore by 120mm. stroke (3⅛ x 4½ in.), and even in some cases go up to 83mm. x 127mm. (3¼ x 5 in.) Doubtless this increase of power is good from the public point of view, but not from the cab owner's.

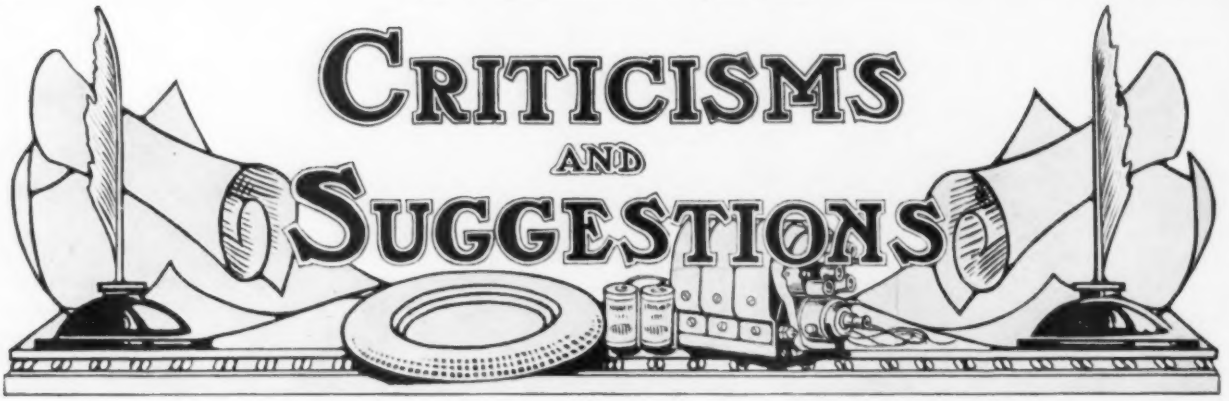
Nowadays a motor cab may be called upon to go anywhere, and it is really this vastly increased range of action that is responsible, for the really lucrative customer, who really matters—the one who wants the cab for long cross country journeys—nowadays insists on a luxurious four-cylinder cab, and so the cab-owning companies force each other's hands in this race for luxury.

The big power is not altogether a disadvantage, however, for it gives more ample margin of power on emergency, and also reduces the number of gear changes, while the bigger engines also allow the power ordinarily required to be obtained at a lower number of revolutions.

MOTOR TRUCKS WANTED BY ITALIAN GOVERNMENT

The Italian Minister of War during the fall of 1909 organized a competition with the object of placing orders for 600 motor trucks for the Italian army. Trials took place during July, 1910, with a light type of motor truck designed for a useful load of 1-1½ tons and a medium type of 2½ tons, and were participated in by trucks manufactured by the Fiat, Zust and Spa firms. According to a report in a military paper the trials were held under exceedingly exacting conditions and the trucks did not fulfill the requirements. It was therefore decided not to order any of the vehicles presented, but to hold a new competition.

The British postal officials are so well satisfied with the service given by the present motor mail-carrying vehicles that they have planned to extend that type of service. The longest through journey has been from London to Birmingham, a distance of 109 miles, but arrangements have been completed to put a line in commission from London to Bristol, a distance of 117 miles.



THE MOST PRACTICAL DRIVE FOR COMMERCIAL CAR

To The Editor Commercial Car Journal.

We would like your opinion as to what you consider the most practical form of drive for heavy-duty trucks, including the chain drive, shaft drive, worm drive, and the method used by the Daimler people; also what you think of the motor under the seat, or in front under the hood.

Dorchester, Mass. A. H. HARRINGTON CO.

The selection of the form of drive for a commercial car depends so largely upon the amount of money to be put into its manufacture, the kind of work it is to do, and public opinion, that it would be difficult to give you a satisfactory answer without knowing more of the conditions under which you are working. In general, the shaft drive with bevel gear operating a bevel gear on the rear axle is not used for heavy commercial cars, owing to the necessity for having a divided rear axle. The simplest and least expensive method is to use side chains from the jack shaft to the rear wheels. This is the common practice. If these chains are encased the drive has a very high efficiency.

Where reductions of from 6 to 14 or 15 to 1 are necessary, shaft drive cannot be employed with bevel gears, owing to the necessarily large size of the bevel wheel. Where a shaft drive is employed under these circumstances a spur gear reduction is usually used in the differential housing in addition to the bevel gears. In such cases a worm drive can be advantageously substituted. For large reductions it has many advantages: quietness, high efficiency as compared with bevel gears plus spur gears or bevel gears plus worn-out chains. This efficiency, if the gears are properly made and of the proper materials, increases after a few months' use and continues high until the worm-wheel teeth or the worm are badly worn. It has the disadvantage of being very costly to manufacture and of being almost useless if not accurately made from the proper materials.

A spur and internal gear as used by Daimler, the latest Benz commercial cars, DeDion Bouton, of France, and the Mais Company in America, substitutes in addition to the bevel gears, spur gears at the ends, meshing with internal gears, but a solid axle is also used, which is a decided advantage on heavy commercial cars; also the drive can be entirely encased the same as a worm drive, but it is not as noiseless as the worm.

To sum up, unless you have expert engineers with years of commercial car experience back of them to lay out your work, you had better stick to the well-known and tried side-chain method.

The motor under the seat, if properly arranged, can be made very accessible, inaccessibility being the general fault found with this arrangement. It gives, however, a longer carrying body for the same wheel base and gives more uniform distribution of the load on the tires. This again has been spoken of as a disadvantage, claiming that there was not enough weight to secure proper traction on the rear wheels. This, however, is disproved daily by commercial cars of this type, which are capable of carrying their loads anywhere.

The foreign practice is to place the engine under a hood in front of the dash. This forces the use of a long overhang at the rear with from seventy to eighty per cent. of the weight on the rear tires. The long overhang with load is also hard on tires, especially when taking corners. The advantages claimed are as follows:

Less weight on the front wheels, therefore easier steering; more traction for the rear wheels, therefore better starting and hill climbing ability.

American practice at present favors the engine under the seat. We believe in accessibility and removable or replaceable units, therefore advocate a position of the motor where it will be most accessible, preferably at the front, and so mounted that it can be entirely removed, if necessary, in a few moments and replaced by another engine.—E. S. F.

To the Editor Commercial Car Journal,
Philadelphia, Pa.

Dear Sir:—You have made a very liberal offer in promising expert advice in solving "Commercial Car" problems. We trust we are not premature in seeking advice, but we should be very glad to hear your opinion with any statistics at hand on Delivery Service of other cities.

We intend to add to our equipment within the next six months, and would appreciate an unbiased opinion from you regarding the cost of maintenance and general stability of Franklin and Alco taxicabs.

Yours very truly,

Frank M. Ritcum, Manager.

In reference to the Franklin taxicab, we would say that inquiry of several concerns, who are using them brought forth the following answers: A company having in operation 44 Franklin taxicabs for about two years state that they have

obtained excellent results, and while they do not give us the cost of operation, state that in comparing them with the cars of other companies with which they are familiar, they find that their cost is as low or lower than that of any other company of which they know. They state that the light weight of the cars effects a wonderful saving on the tires, and the air cooling principle is very beneficial in winter, and that they have had no inconvenience in the hottest days of summer. They state, however, that probably one of the reasons they are getting such good service from their cars is the fact that they have very excellent facilities for handling their business, and exercise great care in the selection and discipline of their drivers.

Another company writes us that they have had a number of Franklin taxicabs in service for 2½ years, and that they have given excellent satisfaction, and have never failed to take a fare to the destination, and were able to run through snow storms when almost every other vehicle was laid up. This company states that their average expense was 2.2 cents a mile for the first two years, but that with the increase in cost of tires, and the consequent increase of tire expense, the expense of running the cars has since increased to about 4 cents per mile.

In reference to the Alco taxicab, a company which has 74 of these in use state, that while they are not in position to give definite figures as to the up-keep, etc., they unhesitatingly believe it to be the best machine made for their business, and will add more of the same make as they need them.—Editor.

MOTORS RECOMMENDED FOR UNDERTAKERS

The use of motor hearses for all funerals, and especially for funerals of persons of means, was strongly agitated at the recent meeting of the Missouri Funeral Directors' Association in Kansas City. William E. Landvogt, president of the organization, was particularly enthusiastic in urging the use of the modern vehicles, both in large cities and small. In his opinion the undertaker without a motor hearse is behind the times. It is predicted that the sentiment created at the meeting of undertakers will result in a large number of orders for the new dead wagons.

"In all of the principal cities of the Middle West funeral directors are using auto hearses or have placed their orders for the same," said Mr. Landvogt. "In St. Louis several are in use, while but one firm in Kansas City has adopted them. In my opinion it will be but a matter of a short time until the majority of funeral directors will have auto hearses and will be in a position to furnish automobiles which will carry relatives and friends to the last resting place of the deceased.

"Why shouldn't everything be up-to-date at a funeral as well as anywhere else? It is the last chance one has on earth and why not have everything that can be afforded? Because a man or a woman who is not rated among the rich is carried to the cemetery in an auto hearse and because friends and relatives follow the remains in automobiles there is nothing to indicate that the relatives are putting on airs. It only shows that the people are keeping up with the times."

Setting out slips in a vineyard formerly necessitated considerable travel in moving slips about. Recently, however, a doctor put 400 slips in the tonneau of his car, drove it all around the vineyard and was enabled to set them up in record time. Agriculturists who watched the performance declare there is an unlimited field of service for a car in setting out many kinds of plants.

SAVES ITS COST IN A YEAR

It is customary with draying firms to write off the original investment for horses and trucks in five years after purchase. A profit shown after that expiration of time is considered a fair return on the investment.

Here is a case, however, where a Knox five-ton truck paid for itself in less than a year, or to be exact, 346 days.

A general trucking company had a contract in one of the large cities to haul an average of forty-eight tons of garbage three miles from the city to the reduction plant. For years this work had been done with horses and careful figures kept of the actual cost. To do the work successfully it required five two-horse teams of three tons' capacity each, making three round trips per day. This arrangement averaged a total daily cost for the five teams of about $30.

Believing it could reduce this expense considerably, the company purchased a Knox five-ton truck about a year ago. Records showed surprising results. After liberal allowances were made for tire repairs, depreciation, wages, etc., the daily cost of operation figured less than $15. This single truck has been able to move the entire forty-eight tons of refuse in each working day of ten hours, thus supplanting five horse-drawn trucks and four drivers.

The Knox truck has effected a saving of $15 a day or actually paid its initial cost in 346 days.

The Old Colony Trust Company, of Boston, Mass., recently installed an all-metal bank wagon mounted on electric chassis manufactured by the General Vehicle Company. The machine will be used for transporting funds, collecting deposits and transferring of articles for the storage vaults of this trust company. The machine has a body which resembles a mammoth safe. The interior is lined with polished mahogany, and the construction is such that the vehicle cannot be entered from any point unless those on the inside operate the locks.

McIntyre Commercial Cars

BY WILLIAM J. JOHNSON

THREE water-cooled and one air-cooled model is the 1911 offering of the W. H. McIntyre Company, of Auburn, Ind. The water-cooled cars are built in 2500, 2000 and 1500 lbs. load capacity, while the air-cooled truck is built in 1200 lbs. load capacity. The 2500 lb. car, or Model XXI, as it is known, is equipped with a four-cylinder, vertical, water-cooled motor of 36 h.p., carried under a forward bonnet, the one-ton model and the 1500 lb. cars being each fitted with double opposed water-cooled motors, carried under a metal bonnet forward. The price of the 2500 lb. car is $1600; 2000 lb., $1300; 1500 lb. vehicle, $950. The air-cooled car is fitted with a two-cylinder opposed motor, and sells for $700.

While the McIntyre Company is a firm believer in the efficacy of the water-cooled prime mover, the air-cooled model is offered for that class of trade who favor this type for one reason or another.

This concern is so well known that no introduction is necessary here. Suffice it to say, that back of the McIntyre vehicles are forty years of horse-vehicle building experience, as well as eight years of pleasure car endeavor, not to mention the past few years devoted to commercial cars. These vehicles are guaranteed to give satisfactory service, and, according to the statements of the company, there are at present a great many McIntyre cars in all branches of service.

W. H. McIntyre, president of the company, is one of the best-versed men in the industry to-day, with which he has been identified, one way or another, since the inception of the pleasure car. A successful builder of horse vehicles, he entered the pleasure car field, and realizing the demand for commercial cars, undertook the construction of what has proven to be a satisfactory and efficient design and construction.

Model XIV

Since the company has long featured the two-cylinder type of car, it is given preference here. This vehicle, as above mentioned, is fitted with a two-cylinder opposed water-cooled motor, carried under a forward bonnet, bore being 5¼ in., stroke 4¾ in., rating being 24 h.p. The cylinders are cast with integral water jackets, which surround the valves. The four supporting lugs, two to each cylinder, are also formed integral, and through these the engine is secured to the subframe. The engine is so designed that by loosening the four anchor bolts, the unit may readily be removed and another substituted, which effects saving of time in an emergency. The cylinders are accurately ground to gage.

The pistons, flat-topped, are fitted with three ground compression rings, diagonally lapped, these placed above the wrist pins, which is 1¼ in. in diameter, and are held in the pistons with a set screw, precluding possibility of working loose. There are four oil grooves below the wrist pins.

Cast-Steel Connecting Rods

The connecting rods used in the McIntyre 24 h.p., two-cylinder opposed engine are made of cast steel, the upper ends being solid bushed with bronze for the piston pin bearing. The lower ends are held together with steel bolts, ½ in. castle nuts and cotter pins in the usual manner, adjustment being through metal shims of varying thickness. The bearings are plain, drilled for oil. The center of the rod is cut away and this, in a sense, serves as an oil scoop in lubricating the cylinder walls.

Heavy-Duty Crankshaft

The crankshaft, a two-bearing member, is of the so-called heavy-duty type; that is, it is much stronger than necessarily need be, but this is purposely so, to ensure a wide margin of safety. Machined all over and ground on the bearing surface, the member is formed with an integral flange, 5 in. in diameter, to which the fan-type flywheel is bolted, the shaft being 2 in. in diameter, front bearing being 3⅞ in. long, rear 4¾ in. long. An oil ring is formed integral with the rear bearing. The timing gear is forced onto the shaft and firmly anchored to position.

The fan flywheel, eight spokes, is 19 in. in diameter, 3½ in. face, and weighs 115 lbs. Being fan-shaped, the usual cooler fan is dispensed with.

All valves, alloy steel, are 2⅛ in. in diameter, these being placed side by side and actuated from a single solid alloy-steel cam shaft. These may be reached through the ports, which are closed in with screw caps. Cast-iron stem guides are formed integral with the crank cover, which also serves as the motor gear housing. To reach the cam shaft it is only necessary to remove this plate, which is held in place with steel studs. The valve springs are of the usual round section steel helical type, held against cup-shaped washers, adjustments being on the push rods.

Crank Case

The cast-iron crank case is formed in two sections, parted vertically, each section being formed integral with

the cylinder, the two parts being bolted together and closed in with the valve carrier cover plate, above described. The front of the case is closed in with another cast-iron housing, which encloses the governor, and which also has formed integral with it a part of the intake manifold.

This two-cylinder motor, without flywheel and including governor, weighs 440 lbs.

Transmission

The power of the prime mover is transmitted to the two-speed planetary transmission through a 1¼ in. alloy-steel propeller shaft equipped with two universal joints.

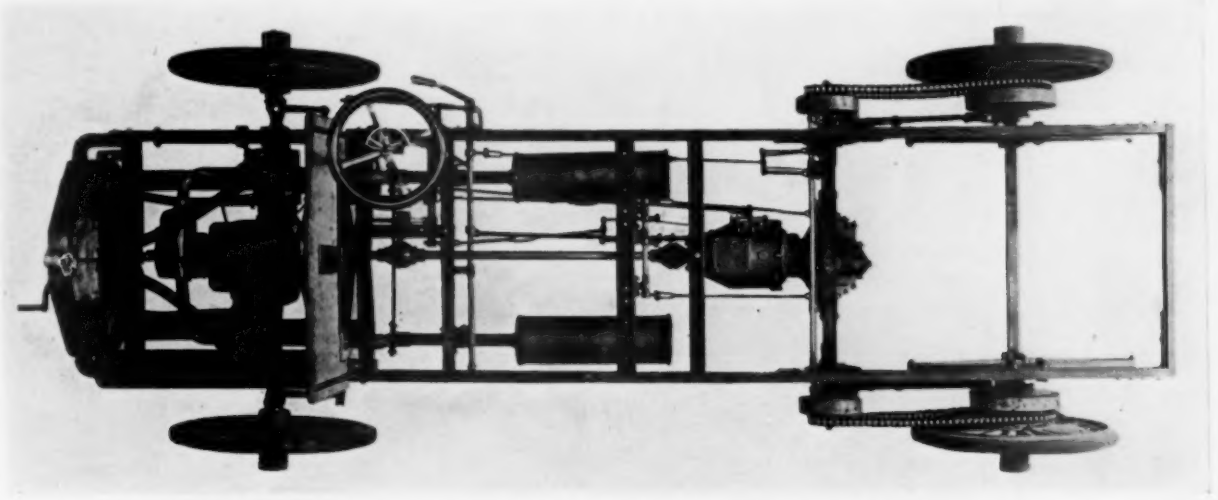
Gears are 8-10 pitch, of ¾ in. face, the ratio being direct 1 to 1; low speed, 2½ to 1; reverse, 6 to 1. The main drive shaft is 1 3-16 in. in diameter. Gears are housed within a cast-steel housing, supported amidships.

Springs

Both front and rear springs are full elliptic, 2 in. wide, nine leaves top and bottom, and 36 in. long, retained to the axles through drop-forged steel clips, and anchored to brackets on the frame sides. Anchoring clips are ⅝ in. square. Drive is through two side distance rods, which are adjustable, these extending from the jack-shaft housing, where they recess in a bronze collar, to the rear axles, these rods being 1 in. in diameter.

Wheels

The wheels are wood, artillery type, 34 in. in diameter, fitted with 2½ in. solid rubber tires front and rear. The wheel base is 119 in. and tread 56 in., though this model is to be had with wider gage, when so ordered, at slight additional cost. Clearance is 12 in.



Chassis of the McIntyre Two-Cylinder Water-Cooled Freight Wagon. On all two-cylinder models the construction is the same, varying in dimensions as dictated by purpose for which the car is intended

The differential driving bevel is of 5 in. pitch, 1 5-16 in. face, inside bevels being 5-7 pitch, 53 and 15 teeth, ratio being 3½ to 1. The jack shaft is 1¼ in. in diameter, housed within steel tubes 2¼ in. in diameter, these extending from the cast-steel differential housing. The transmission and differential housings form a single unit. Bearings throughout the assembly are roller type. The clutch rocker shaft is 1 in. in diameter, and the speed change levers are ⅝ in. in diameter, adjustable. The front sprockets are keyed to the jack shaft and held in place with hexagon nuts and cotter pins.

Final drive is through double side roller chains to the rear wheel sprockets, these rear members being clip-retained to eight spokes through steel band clips.

The differential transmission unit housing is secured at three points, one forward at cross member of the frame and at the jack shaft ends in brackets secured to the frame side members.

Axles

McIntyre axles, front and rear, are solid steel forgings, square in design, 1¾ x 1¾ in., wheel bearings being Timken roller. The front member is forged with integral steering jaws, which are designed in keeping with the service for which the car is intended. Steering pivots are alloy steel, carefully treated, to ensure strength and long life with minimum wear. The steering rods are bushed.

Frame

The frame is of channel steel, reinforced wherever deemed necessary. The motor, as previously mentioned, is suspended on a removable subframe. All joints are hot-riveted. The forward cross member is rounded and serves as a fender.

Cooling

The natural system of thermo-syphon cooling is employed in the McIntyre two-cylinder, 24 h.p. truck, the cooler being carried on a cross member of the frame, and is of the vertical tube type, with ample water connections. The flywheel, as previously mentioned, is fan-spoked, and draws the cooling air through the radiator. This system, of course, eliminates the pump and kindred assembly, which makes for simplicity, the efficacy of thermo-syphon cooling being now well established.

Lubrication

Lubrication is through a self-contained circulating system, a gear pump being employed to force the lubricant as needed. The capacity of the oil tank is 1½ gallons.

Carburetor

An automatic carburetor is employed, this being disposed in front of the left motor cylinder and secured to an integral inlet passage of the motor governor housing, the

mixture finally being passed out through the top of the governor case, through a Y-shaped lead, to each of the cylinders, connections at the cylinders being provided with copper asbestos gaskets. This intake manifold is brass, 1¾ in. in diameter.

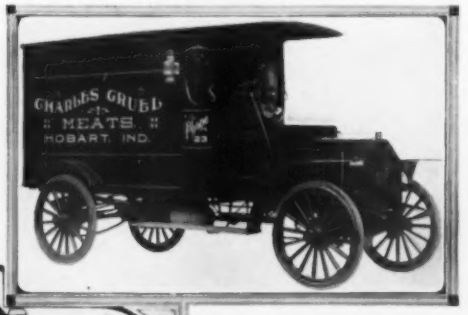
The exhaust manifolds, one to each cylinder, with individual muffler carried along the frame side rail, are 2 in. in diameter.

Brakes

Of brakes, there are two on the rear wheels, of the external contracting order, brake lining being Raybestos. Action is through steel pull bars, 7-16 in. in diameter, adjustable, brake rocker shaft and equalizer being ⅞ in. in diameter.

Engine Governor

Realizing that many drivers are prone to speed, a governor is fitted on the McIntyre two-cylinder, opposed 24 h. p. motor, this, as before stated, being housed within a cast-iron case, bolted to the front of the crank case proper, and having integral with it a mixture intake. The working of this member is clearly shown in the accompanying "cut-away" illustration. The governor, it will be noted, is secured to the forward extension of the engine shaft and fitted with weights (3) engaging in an annular groove in the sliding collar (6). Tension springs (4) are fitted between this sliding collar and the runner, there being two of these. The member may be adjusted as desired, and once the desired effect has been attained, the driver cannot tamper with it without breaking a seal (8). A butterfly valve (10) is located between the intake and the carburetor, and when the engine runs at excessive speed the governor automatically comes into play and closes the butterfly valve between the intake and the carburetor. This device has worked out very well in actual service. The need of it is considered imperative as a means of prolonging the life of the vehicle and tires and holding down repair bills.



Two Views of McIntyre Models: the upper showing a two-cylinder chassis fitted with a delivery wagon body. The lower cut is the McIntyre Model VII Freight Wagon equipped with a two-cylinder water-cooled motor.

Ignition

Ignition is by dual, high-tension system, with magneto and dry cells, the latter used for emergencies and for starting the engine. The magneto is mounted on the head of the crank case and is driven from the timing gears through a flexible coupling. Ignition is controlled from the combination dash switch and from the steering column. The spark plugs are located on top of the cylinders and are easily accessible.

Control

Control is in the usual manner. Brakes are worked through a foot pedal, while a hand side lever and a foot pedal control the transmission. Spark and gas are controlled from the steering wheel through two hand buttons.

Steering

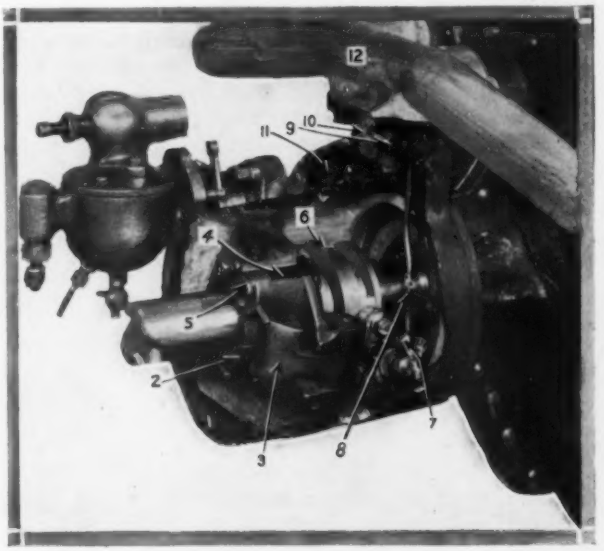
The McIntyre 24 h.p. commercial car is steered from the right, an 18 in. hand wheel being secured to the 1¾ in. steering post. The steering rods are in front of the axle and are ⅞ in. in diameter. The steering pivots are drop-forged steel, with thrust taken up through thrust bearings. The steering system is of a gear type, the case, cast steel, being secured to the right side frame rail.

Bodies

Bodies are according to the desire of the purchaser, and there is a wide range of choice. The standard express body has length back of the seat, inside, of 8 ft. 10 in., with width of 3 ft. 6 in. The equipment includes three oil lamps, horn, tools, and the like. Standard color is Brewster green with red-striped running gear. Total width is 5 ft. 6 in., total length, 15 ft. 7 in. Net weight is 2200 lbs. This model, with regular equipment, is set at 1200 r.p.m. Larger tires than standard are to be had at a slight additional cost.

Model XXI

The Model XXI differs from the Model XIV in that it is equipped with a four-cylinder motor with twin cast cylinders, having integral water jackets. The same type chassis and transmission are employed and the same type



Governor of the McIntyre Two-Cylinder Opposed Water-Cooled Motor. Vertical rod at the right, it will be noticed, operates butterfly valve in the intake. Portion of the intake manifold is integral with the governor housing.

and size of axles, the front tires being 34 x 3 in., rear 34 x 3½ in. The spring equipment is semi-elliptic forward and platform type rear, both front and rear members having nine leaf sections, 2 in. wide.

Long-Stroke Motor

The four-cylinder motor is of the long-stroke type, stroke being 4¾ in., bore 4⅛ in., rating 35 h.p. The unit is of the L-type, with valves all on one side of the engine, worked from a single solid cam shaft, all valves being alloy steel, 1⅞ in. in diameter, with a lift of ⅜ in. The cylinders are held to the crank case through studs and nuts.

The pistons are rather long, which has a tendency to overcome undue wear and side play, there being three rings above the hollow hardened and ground steel piston pin 1⅞ in. long.

Connecting rods are drop-forged steel, I-beam section, plain bearings on the crank-pin ends, which are held together with bolts, castle nuts and cotter pins. The upper ends are bronze bushed.

The crankshaft is a solid drop-forging, specially heat-treated, bearings being 1⅝ in. in diameter, 4 5-16 in. long at flywheel end, 2½ in. center, 3¾ in. long forward. The connecting-rod bearings are 1¾ x 2¼ in. All crank bearings are adjustable through bushings, bearings being plain Babbitt. The shaft is forged with an integral flange, 5 in. in diameter, to which the flywheel is bolted. Connecting rods are 10 in. between centers. Flywheel is 17 x 4 in.

The cam shaft is a solid alloy-steel member, fitted with three large plain bearings. The valve lifters are fitted at the bases with hardened and ground steel rollers carried in bronze guides, retained in the crank case through drop-forged steel yokes. These valve guides are cast iron, the yokes being held in place by ⅜ in. steel studs and nuts.

The motor gears, of steel, are carried in a forward compartment closed in by a cover plate, phosphor-bronze bushings being fitted.

Crank Case

The crank case is cast in two sections of aluminum, the motor bearings being held in the upper section. The bottom section is simply an oil pan. The supporting arms are cast-steel members, bolted to the subframe sides, the motor being bolted to these arms through four ½ in. steel studs, frame side anchorage being through four ½ in. steel bolts. The center distance between these arms is 22¾ in. The under pan or oil reservoir extends the full length of the case.

Lubrication

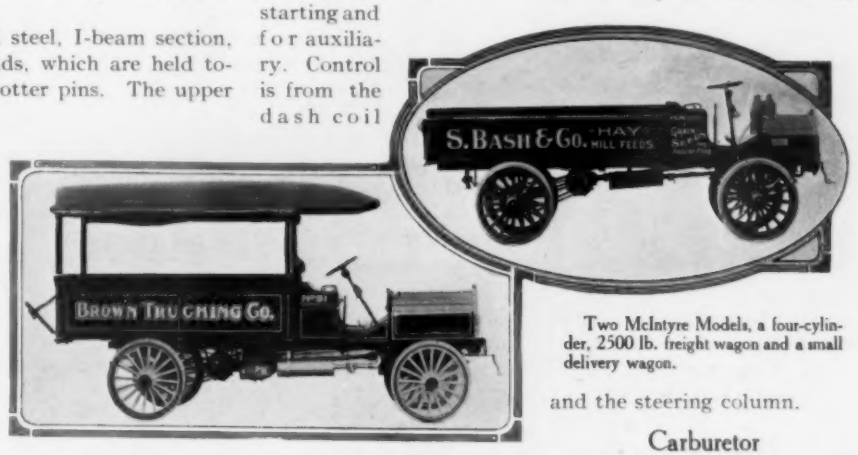
The oil is distributed to all bearing surfaces by a four-lead geared pump, driven from the cam shaft through bevel gears. Drip troughs, in the lower half of the crank case, carry an ample supply of oil, which is lifted by spouts or scoops in the lower ends of the connecting rods. Wall lubrication is, of course, by splash, which also cares for the timing gears as well as the cam-shaft bearings. The oil-pump shaft is ⅜ in. in diameter, the oil leads to the main bearings being 3-16 in. outside diameter. A sightfeed oiler on the dash denotes the working of the system.

Cooling

Here, again, is the thermo-syphon system of cooling employed. The 1½ in. brass water intake is located on the right side of the motor, the water entering the jackets at the lowest point and, after circulation, passing out through the heads. A four-bladed, ball-bearing fan is mounted back of the cooler, driven through a 1 in. flat belt. The vertical tube radiator is mounted on a cross member of the frame.

Ignition

Ignition is by a dual system, with magneto on the right side of the engine, driven from the motor gears through a ⅞ in. shaft and coupling. The spark plugs are located in screw plugs over the inlet valves. Dry cells are used for starting and for auxiliary. Control is from the dash coil and the steering column.



Two McIntyre Models, a four-cylinder, 2500 lb. freight wagon and a small delivery wagon.

Carburetor

An automatic float-feed carburetor is used, this being on the left, or working side of the engine, the Y-shaped aluminum intake being 2 in. in diameter, the gray-iron exhaust 2¼ in., both held in place on the cylinders through bronze spreader clamps, ½ in. bolts for the exhaust, ⅜ in. bolts for the intake.

Steering

Steering is through positive gear set, with case secured to the frame on the right. The steering connections are in front of the axle. The steering wheel is 18 in. in diameter, the post 1¾ in.

Subframe

The motor is carried on a subframe, which renders the removal of the engine a simple matter. The subframe, like the main member, is made of channel steel, in one piece, which is slightly curved in front of the cooler, protecting that member in case of accident.

Transmission

The transmission, as previously mentioned, is the same as that employed in the one-ton car, and to compensate for the increased power of the engine, the main frame is trussed with steel rods, which extend from the rear cross member to a point about amidships of the front springs, these brace rods being ½ in. in diameter.

In other respects, the Model XXI follows the same general construction as that of the one-ton car. The brakes are internal-expanding members, located on the rear wheels, and there is also the jack-shaft brake. The control is similar to that of the Model XIV.

mixture finally being passed out through the top of the governor case, through a Y-shaped lead, to each of the cylinders, connections at the cylinders being provided with copper asbestos gaskets. This intake manifold is brass, 1¾ in. in diameter.

The exhaust manifolds, one to each cylinder, with individual muffler carried along the frame side rail, are 2 in. in diameter.

Brakes

Of brakes, there are two on the rear wheels, of the external contracting order, brake lining being Raybestos. Action is through steel pull bars, 7-16 in. in diameter, adjustable, brake rocker shaft and equalizer being ⅞ in. in diameter.

Engine Governor

Realizing that many drivers are prone to speed, a governor is fitted on the McIntyre two-cylinder, opposed 24 h. p. motor, this, as before stated, being housed within a cast-iron case, bolted to the front of the crank case proper, and having integral with it a mixture intake. The working of this member is clearly shown in the accompanying "cut-away" illustration. The governor, it will be noted, is secured to the forward extension of the engine shaft and fitted with weights (3) engaging in an annular groove in the sliding collar (6). Tension springs (4) are fitted between this sliding collar and the runner, there being two of these. The member may be adjusted as desired, and once the desired effect has been attained, the driver cannot tamper with it without breaking a seal (8). A butterfly valve (10) is located between the intake and the carburetor, and when the engine runs at excessive speed the governor automatically comes into play and closes the butterfly valve between the intake and the carburetor. This device has worked out very well in actual service. The need of it is considered imperative as a means of prolonging the life of the vehicle and tires and holding down repair bills.

Two Views of McIntyre Models; the upper showing a two-cylinder chassis fitted with a delivery wagon body. The lower cut is the McIntyre Model VII Freight Wagon equipped with a two-cylinder water-cooled motor.

Ignition

Ignition is by dual, high-tension system, with magneto and dry cells, the latter used for emergencies and for starting the engine. The magneto is mounted on the head of the crank case and is driven from the timing gears through a flexible coupling. Ignition is controlled from the combination dash switch and from the steering column. The spark plugs are located on top of the cylinders and are easily accessible.

Control

Control is in the usual manner. Brakes are worked through a foot pedal, while a hand side lever and a foot pedal control the transmission. Spark and gas are controlled from the steering wheel through two hand buttons.

Steering

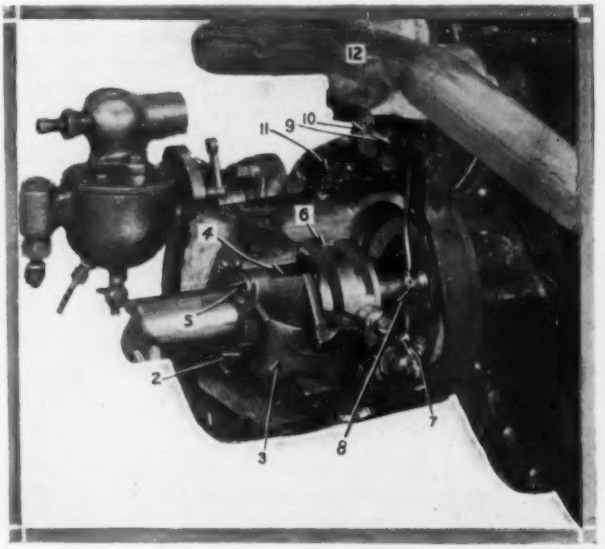
The McIntyre 24 h.p. commercial car is steered from the right, an 18 in. hand wheel being secured to the 1¾ in. steering post. The steering rods are in front of the axle and are ⅞ in. in diameter. The steering pivots are drop-forged steel, with thrust taken up through thrust bearings. The steering system is of a gear type, the case, cast steel, being secured to the right side frame rail.

Bodies

Bodies are according to the desire of the purchaser, and there is a wide range of choice. The standard express body has length back of the seat, inside, of 8 ft. 10 in., with width of 3 ft. 6 in. The equipment includes three oil lamps, horn, tools, and the like. Standard color is Brewster green with red-striped running gear. Total width is 5 ft. 6 in., total length, 15 ft. 7 in. Net weight is 2200 lbs. This model, with regular equipment, is set at 1200 r.p.m. Larger tires than standard are to be had at a slight additional cost.

Model XXI

The Model XXI differs from the Model XIV in that it is equipped with a four-cylinder motor with twin cast cylinders, having integral water jackets. The same type chassis and transmission are employed and the same type



Governor of the McIntyre Two-Cylinder Opposed Water-Cooled Motor. Vertical rod at the right, it will be noticed, operates butterfly valve in the intake. Portion of the intake manifold is integral with the governor housing.

and size of axles, the front tires being 34 x 3 in., rear 34 x 3½ in. The spring equipment is semi-elliptic forward and platform type rear, both front and rear members having nine leaf sections, 2 in. wide.

Long-Stroke Motor

The four-cylinder motor is of the long-stroke type, stroke being 4¾ in., bore 4¼ in., rating 35 h.p. The unit is of the L-type, with valves all on one side of the engine, worked from a single solid cam shaft, all valves being alloy steel, 1⅞ in. in diameter, with a lift of ¾ in. The cylinders are held to the crank case through studs and nuts.

The pistons are rather long, which has a tendency to overcome undue wear and side play, there being three rings above the hollow hardened and ground steel piston pin 1⅞ in. long.

Connecting rods are drop-forged steel, I-beam section, plain bearings on the crank-pin ends, which are held together with bolts, castle nuts and cotter pins. The upper ends are bronze bushed.

The crankshaft is a solid drop-forging, specially heat-treated, bearings being 1¾ in. in diameter, 4 5-16 in. long at flywheel end, 2½ in. center, 3¾ in. long forward. The connecting-rod bearings are 1¾ x 2¼ in. All crank bearings are adjustable through bushings, bearings being plain Babbitt. The shaft is forged with an integral flange, 5 in. in diameter, to which the flywheel is bolted. Connecting rods are 10 in. between centers. Flywheel is 17 x 4 in.

The cam shaft is a solid alloy-steel member, fitted with three large plain bearings. The valve lifters are fitted at the bases with hardened and ground steel rollers carried in bronze guides, retained in the crank case through drop-forged steel yokes. These valve guides are cast iron, the yokes being held in place by ¾ in. steel studs and nuts.

The motor gears, of steel, are carried in a forward compartment closed in by a cover plate, phosphor-bronze bushings being fitted.

Crank Case

The crank case is cast in two sections of aluminum, the motor bearings being held in the upper section. The bottom section is simply an oil pan. The supporting arms are cast-steel members, bolted to the subframe sides, the motor being bolted to these arms through four ½ in. steel studs, frame side anchorage being through four ½ in. steel bolts. The center distance between these arms is 22¾ in. The under pan or oil reservoir extends the full length of the case.

Lubrication

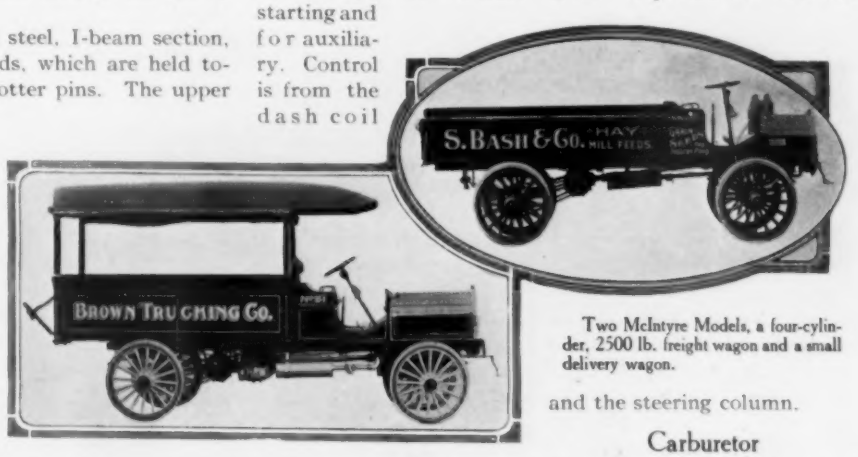
The oil is distributed to all bearing surfaces by a four-lead geared pump, driven from the cam shaft through bevel gears. Drip troughs, in the lower half of the crank case, carry an ample supply of oil, which is lifted by spouts or scoops in the lower ends of the connecting rods. Wall lubrication is, of course, by splash, which also cares for the timing gears as well as the cam-shaft bearings. The oil-pump shaft is ¾ in. in diameter, the oil leads to the main bearings being 3-16 in. outside diameter. A sightfeed oiler on the dash denotes the working of the system.

Cooling

Here, again, is the thermo-syphon system of cooling employed. The 1½ in. brass water intake is located on the right side of the motor, the water entering the jackets at the lowest point and, after circulation, passing out through the heads. A four-bladed, ball-bearing fan is mounted back of the cooler, driven through a 1 in. flat belt. The vertical tube radiator is mounted on a cross member of the frame.

Ignition

Ignition is by a dual system, with magneto on the right side of the engine, driven from the motor gears through a ⅞ in. shaft and coupling. The spark plugs are located in screw plugs over the inlet valves. Dry cells are used for starting and for auxiliary. Control is from the dash coil and the steering column.



Two McIntyre Models, a four-cylinder, 2500 lb. freight wagon and a small delivery wagon.

Carburetor

An automatic float-feed carburetor is used, this being on the left, or working side of the engine, the Y-shaped aluminum intake being 2 in. in diameter, the gray-iron exhaust 2¼ in., both held in place on the cylinders through bronze spreader clamps, ½ in. bolts for the exhaust, ⅜ in. bolts for the intake.

Steering

Steering is through positive gear set, with case secured to the frame on the right. The steering connections are in front of the axle. The steering wheel is 18 in. in diameter, the post 1¾ in.

Subframe

The motor is carried on a subframe, which renders the removal of the engine a simple matter. The subframe, like the main member, is made of channel steel, in one piece, which is slightly curved in front of the cooler, protecting that member in case of accident.

Transmission

The transmission, as previously mentioned, is the same as that employed in the one-ton car, and to compensate for the increased power of the engine, the main frame is trussed with steel rods, which extend from the rear cross member to a point about amidships of the front springs, these brace rods being ½ in. in diameter.

In other respects, the Model XXI follows the same general construction as that of the one-ton car. The brakes are internal-expanding members, located on the rear wheels, and there is also the jack-shaft brake. The control is similar to that of the Model XIV.

Standard colors are Brewster green with red running gear, striped. Speed is four to fifteen m.p.h., and the equipment includes three oil lamps, horn, tools, jack, and the like. Total length is 15 ft. 7 in., total width, 5 ft. 6 in.; net weight, 2500 lbs.

Model VII

The Model VII, 1500 lbs. load capacity McIntyre two-cylinder, opposed commercial car differs from the Model XIV only in that it is correspondingly smaller throughout. The motor is of the same type; the same is true of the transmission and other elements. This, as in other models, is to be had with varied body equipment, as desired. The motor of this vehicle is square, that is, 4½ x 4½ in., rated at 20 h.p. The connecting rods, instead of being cast steel, as in the larger two-cylinder truck, are of manganese bronze. Cooling is thermo-syphon.

Model 211

This is a two-cylinder, air-cooled delivery wagon of 1200 lbs. load capacity, 20 h.p., with motor under the body, about center. Drive is through double side chains, the transmission being a planetary type. The inside of the body is 7 ft. 9 in. by 3 ft. 3 in., wheel base being 86 in.; tread standard, though wider gage is to be had when specified, at a slight expense. Artillery-type wood wheels are used, these being 34 in. in diameter, with 1¾ in. tires front, 2 in. rear. Clearance is 14 in., and drive from the transmission to jack shaft is through a chain. The frame is angle steel, hot-riveted, 2 x 2 x ¼ in., 32 in. wide, 9 ft. 4 in. long. The springs are full-elliptic, 1½ in. wide, six leaves, of oil-tempered steel. The drop-forged axles are 1¼ in. square, wheel bearings being roller. The gear ratio is 6 to 1, and from fifteen to twenty miles can be traveled on one gallon of gasoline.

Ignition is by magneto and dry cells, lubrication from mechanical oiler. The net weight of this vehicle is 1900 lbs.

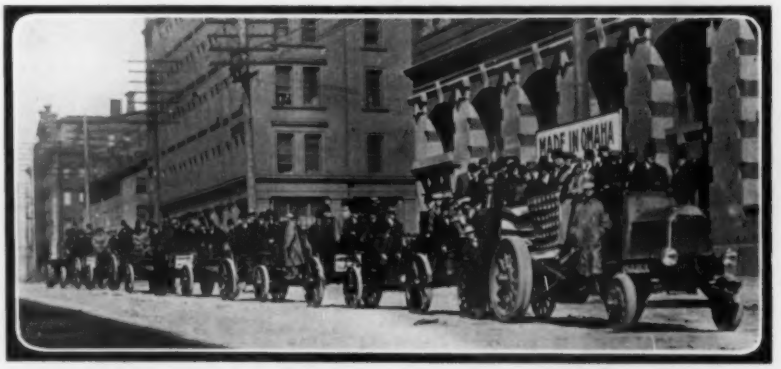
On the Road

It was one of those rainy days, common to the early Spring of this season, when the writer visited the McIntyre factory at Auburn. This is rather an attractive little town, but the good roads, in early Spring, are confined to the center proper. In order to show what each model would do, the writer was given a demonstration, in each case, over the soft, muddy roads leading from the factory to the open country. It had rained hard early that morning, so that the roads were in the worst possible condition. A five mile test run was selected, leading north from the factory. That demonstration accorded in the two-cylinder, 24 h.p. car was the most noteworthy of all four given, since, at this stage, the hardest going is encountered. When about three miles from the factory, the driver of the vehicle met two double horse teams coming towards him and had, as a matter of courtesy, to pull to one side, and, in so doing, the wheels became embedded up to the hubs. This was not exactly what would be expected in actual service, for such conditions would, ordinarily, be regarded as an imposition. When the driver attempted to get back on the road proper, he had a merry time of it, since the solid tires were not equipped with any sort of gripping device. But this one instance alone showed up the McIntyre car advantageously under severe conditions. Without going into lengthy details, the driver got his car onto the road, with mud up to the hubs, and then took the hill without further incident. It was an excellent test of the general construction, motor, transmission and driving chains. Such other demonstrations as were accorded were satisfactory and conclusive.

THE "ST. LOUIS GIANT" GAS-ELECTRIC COMMERCIAL CAR

The Downs Tractor Company, of St. Louis, Mo., formerly the Omaska Tractor Manufacturing and Foundry Company, of Omaha, Neb., has been reorganized with St. Louis capital, and will manufacture a gas-electric motor truck and a battery-electric limousine. G. H. Down is president and engineer of the present company. A factory is to be built in St. Louis. Pending the completion of a factory, the company has leased a four-story building at 1513-19 Pine street, with a floor area of 35,000 sq. ft., where the machines are to be built. After the factory is completed this building is to be used for sales and office quarters.

The first machine built by this company is being used for demonstration purposes. It weighs eight tons without load, and is powered by a 50 h.p. gasoline engine, which is directly connected to a 20 kilowatt, 250 volt, 1,025 r.p.m. compound-wound generator. The latter furnishes energy to two 11 h.p. electric motors, 220 volts, 700 r.p.m., which are suspended on the frame of the truck in front of the rear wheels, sufficient distance from the rear wheels to enable a powerful pull. From the motors the drive is to a countershaft, and from the countershaft to the rear wheels by chain. This truck is built for 20 tons capacity. The side of the front wheels is 36 in. and the rear wheels 60 in. The speeds and control are identically the same as seen on electric street cars. The controller has 5 speeds, ranging from 2½ to 20 m.p.h. The truck has no clutch, transmission, universal joint or differential gear, all controls and speeds being handled in the controller box, situated handy to the driver. The turning device on the truck is the fifth wheel or turn-table, handled by a worm-gear attached to the end of the steering column. This turn-table device allows the truck to practically turn in its own length.



Showing the Great Carrying and Pulling Capacities of the "St. Louis Giant" Gas-Electric Commercial Car. In this instance the machine pulled six dump wagons with 126 men aboard. The weight of the load, including the car, was twenty-five tons, and taking into consideration the drag pull, the actual tonnage handled on this occasion was practically forty-two tons.

The Rovan Front-Wheel Drive and Steer Truck, with Worm-Driven Front Axle

BY D. E. SCRIBER

THE Kinnear Manufacturing Company, of Columbus, Ohio, the well-known manufacturers of fireproof rolling steel doors, some two years ago decided upon the manufacture of a line of motor trucks. This new line of cars is peculiar in that the smaller vehicles drive and steer by the front wheels only, while the larger trucks drive and steer by all four wheels. The design is due to exhaustive tests made by R. H. Rosenberg, an Austrian engineer who has had years of experience abroad, and who has also been connected with several of the largest automobile manufacturers of this country.

The chief feature of these machines, as mentioned, is that the power is delivered to the front wheels in all cases, the small trucks being driven from the front wheels only through a worm-drive axle, thus pulling their load instead of pushing it. The power is from a two-cylinder opposed gasoline engine of 5¼ in. bore by 4½ in. stroke, rated as 22 h.p. by the A. L. A. M. formula.

There is no electrical mechanism, as is often used with four-wheel-driven machines. In this case the power is transmitted directly from the engine, which is located under the front seat, through a shaft running toward the front instead of towards the rear, a very compact three-speed and reverse sliding gear, and a steel worm drive and a bronze worm wheel on the full-floating front axle, the construction of which will be taken up later. The interesting feature is the method of transmitting the power from this full-floating axle to the wheels, and this has been worked out in about as simple a form as has ever been shown in this country or abroad.

Fig. 1. Front View, showing the worm-drive front axle

The Hub Universal-Joint Drive

The method of transmitting power to the wheels can be understood, reference being had to the accompanying sectional drawing of the wheel hub. The shaft is squared at the end, driving a ball with trunnioned ends, which in turn drives the split hub of the wheel by means of a ring within the hub.

Floating axle shaft D is squared at the end E as shown. The squared portion fits into a broached hole in the trunnion ball, the center of which is at the exact center of the wheel. The rotation of the ball causes the ring B to rotate around the axis CD, the trunnions driving the ring. As the ring B is gripped in an annular groove by the two halves of the hub A, the rotation of the ring around the axis CD drives the hub, but at the same time ring B is free to move in its slot, in the plane of the paper. The halves of the hub are made of cast vanadium steel and held together by 4½ in. vanadium steel bolts.

The bearings of the wheel as shown are nontapered rolls with a raised annular ring at the center, which gives them remarkable end-thrust ability. These are of the annular nonadjustable type. The outer shell, F, of the hub is carried by the yoke ends of the front-axle housing, and is of course stationary, as far as rotation is concerned, but is pivoted at G and H for steering. The joint between the rotating portion or wheel hub and the other part, F, is made water and dust-tight, both at the inside and outside, by two brass washers, II, on each side of a felt washer J. It will be seen that this construction is unusually simple, very compact, and that the driving surface of the ring B, in contact with the hub, is extremely large.

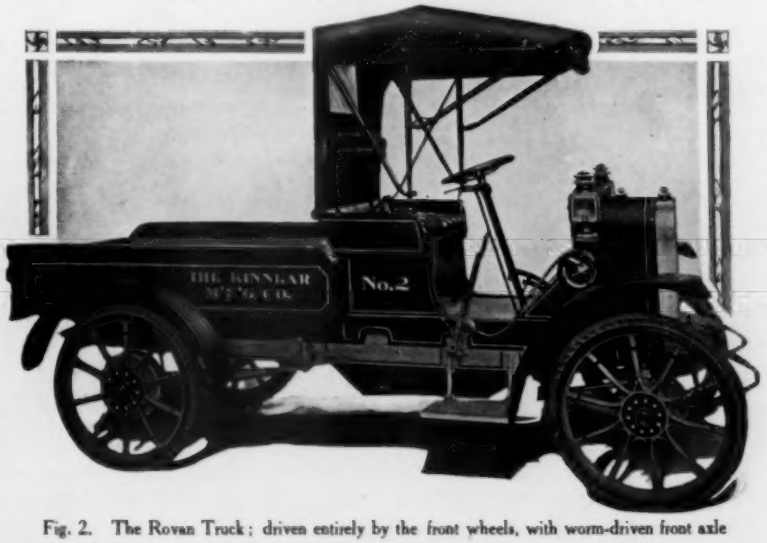


Fig. 2. The Rovan Truck; driven entirely by the front wheels, with worm-driven front axle

The front axle consists of a steel tube at each end, the center being a vanadium-steel casting, trussed top and bottom, machined as one piece, and then cut in two and held together by vanadium-steel bolts. At the front end is a cap held by bolts and at the rear the trans-

mission housing is bolted to it. Both of these parts, that is, the cap and transmission housing, tie the vanadium-steel housing together at the top. At the outer ends are vanadium cast yokes shrunk onto the end of the steel tubular housing.

The spring saddles, which carry the springs underslung, are revolutely mounted by means of integral-band spring saddles, which are placed over the tubular axle before the ends are shrunk on. Tests upon these axles on the 1500 lbs. delivery wagon, by resting the axles on supports at the spring saddles, have shown that it will carry a weight of eighteen tons before taking a permanent set, which puts at rest at once any question as to required strength for a light delivery wagon.

The steering arm is rigidly bolted to lugs which hold the two halves of the casing F together, the cross connecting link of the steering mechanism being in front. The wheels are of the usual artillery type, 1¾ in. spokes, ten in number, fitted with Motz 36 in. x 4 in. solid tires.

Arrangement of Parts Reversed

The worm drive consists of a quadruple-thread worm of chrome-nickel steel which drives a worm wheel of bronze. Running towards the rear, under the floor boards, is a shaft to a three-speed sliding gear, the housing of which is bolted directly to the differential housing at the center of the front axle, the differential being of the four-pinion type. This change-speed mechanism is controlled by a single selective type side lever at the right. A three-plate dry clutch, the plates being faced with Non-burn, is used. This clutch is operated in the usual manner by a cross shaft and yoke connected to the usual clutch. A fan-plate flywheel is at the front of the engine, which is mounted crosswise under the front seat and supported directly on the side members by lugs on the cylinder head.

The ignition is by Mea magneto, which is mounted directly on top of the crank-case cover, gear and shaft-driven from the half-time gear train.

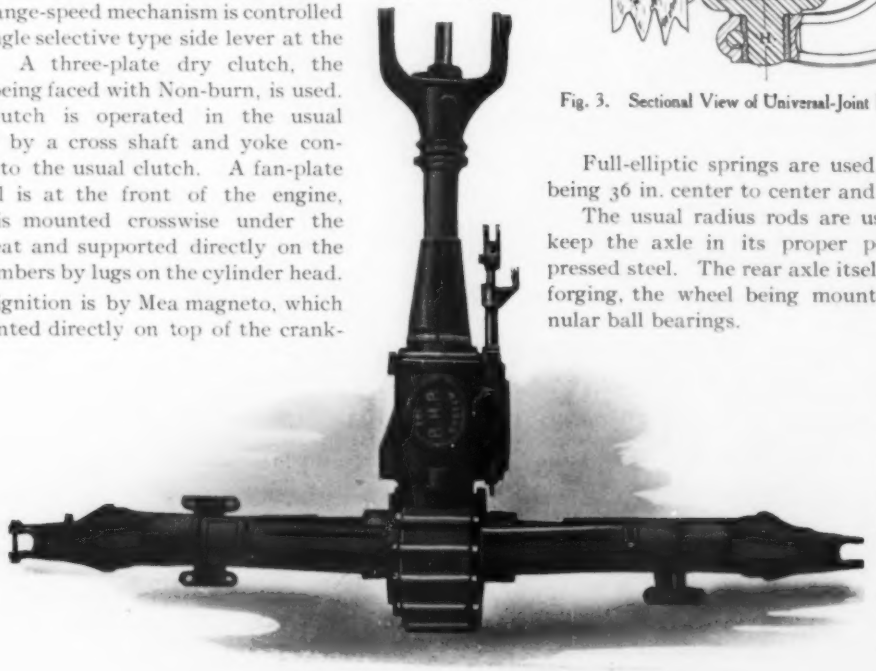


Fig. 4. Plan of Front Axle and Transmission of the Rovan Truck

A Stromberg carburetor is used, the gasoline being fed by gravity from a fifteen-gallon tank at the rear of the radiator, the outside of this tank being shaped like the ordinary hood. At the rear of this is the usual straight board dash. The slanting floor boards are Pyramid aluminum castings.

Steering is by a hand wheel on an almost vertical column on the right. The steering mechanism itself being the Ross differential worm type, connected to the right front steering arm in the usual manner.

The frame is pressed steel, channel section, unswept at the front. There is no mechanism of any kind under the load-carrying platform. Empty, the truck carries about two-thirds of its weight on the front wheels. For each one hundred pounds of load placed on the body about thirty-three and one-third pounds come on the front wheels, giving, it is claimed, under normal load conditions, sufficient traction to climb a forty-five per cent. grade.

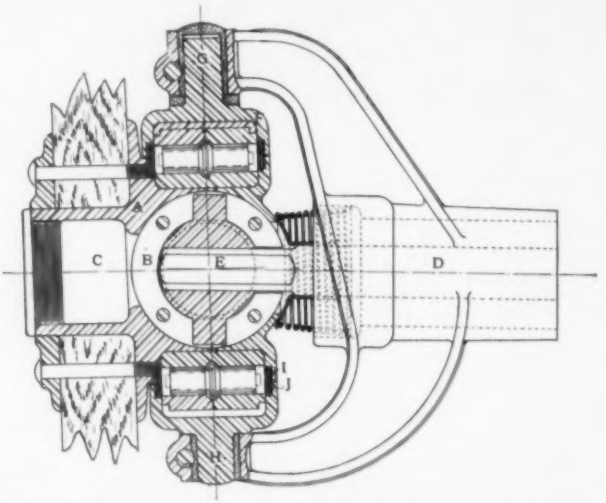


Fig. 3. Sectional View of Universal-Joint Driving Arrangement in Front Hub

Full-elliptic springs are used, front and rear, the front being 36 in. center to center and the rear 38 in., 2 in. wide.

The usual radius rods are used at the rear, simply to keep the axle in its proper position; these rods being pressed steel. The rear axle itself is an I-beam section drop forging, the wheel being mounted on New Departure annular ball bearings.

Brakes

The rear wheels are fitted with pressed-steel drums 14 in. in diameter, 2 in. face, inside of which, at the upper half, are two shoes pivoted at the top point and two shoes at the bottom pivoted at the bottom point, these four shoes being expanded against the drum by two cams, one at the front and one at the rear, giving what the company calls a quadruple expanding brake. The shoes are malleable castings faced with Thermoid, the contact being almost the entire circumference of the drum when the brakes are applied. This is the only set of brakes on the machine, the brake pedal being ratcheted for holding the machine on hills. The wheel base is 104 in. A short runningboard is used on each side, mounted on pressed-steel stephangers.

The under portion of the engine-driving mechanism is protected by a pan. The engine is cranked from the side instead of the front.

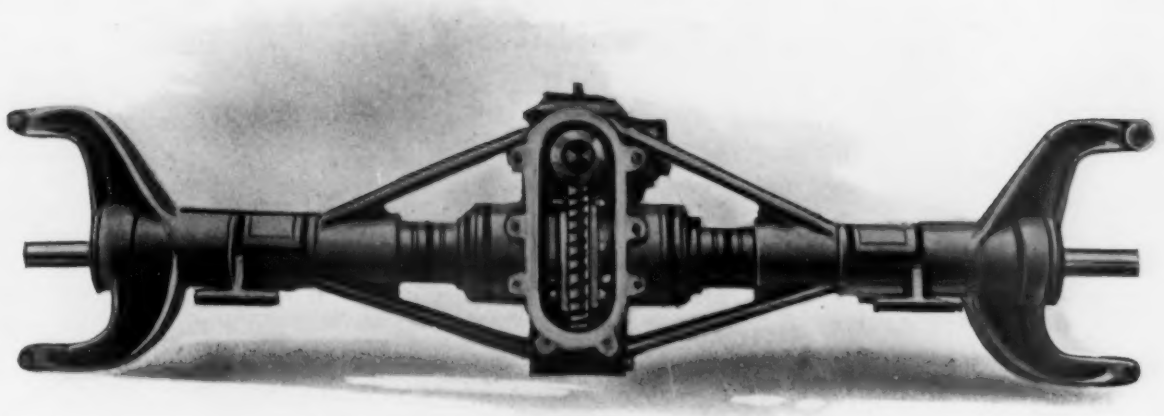


Fig. 5. Front Axle With Cover of Housing Removed, showing the worm wheel

The radiator, which is of the vertical tube type, is mounted on trunnions at the front, giving it a flexible support, which avoids any possibility of leakage due to frame distortion.

The cooling is by thermal circulation, 1¼ in. pipes being used. For a front-driven machine, details have been worked out with great cleverness and the car shows every appearance of substantial construction.

With open body, the 1500 lbs. truck sells for $1000.

Public Service Motor Car Converts

THE HUNTINGTON, W. Va., board of commissioners expect to purchase an auto patrol in July.

BROOKLYN, N. Y., has placed in service ten motor cars for use of the fire chiefs and district engineers.

THE HUMANE FIRE COMPANY, of Mahanoy City, Pa., has ordered a Seagraves combination chemical and hose auto truck.

JACKSONVILLE, FLA., has a new motor patrol, made by the Gramm Motor Car Company, to the special specifications of Chief Vinzant.

THE FIRE DEPARTMENT OF MILNEBURG, LA., is to have a motor fire-extinguisher as soon as one can be contracted for and built.

SANTA ROSA, CAL., has authorized the purchase of a Pope-Hartford fire truck similar in design to the one now in use at San Bernardino.

THE LOUISVILLE, KY., board of public safety has placed an order for its second Oldsmobile patrol. The one now in use has proved an economy.

PAWTUCKET, R. I., has received its Webb motor fire engine, and if the tests are successful it will be accepted by the city. The purchase price is $9000.

NORTH BRADDOCK, PA., has in service a Packard combination fire truck, with special body and equipment. Increased efficiency is claimed for the apparatus.

ST. JOHNS COUNTY, FLA., has purchased a commercial car for use in shelling the John Anderson boulevard to the Duval county line. The machine is a Gramm.

JENKINTOWN, PA., is the first municipality in the state to have motor fire fighting apparatus exclusively. Both companies are now equipped with specially built cars.

OLEAN, N. Y., is now the proud possessor of as fully equipped, up-to-date fire truck, which was manufactured by the American La France Company, of Dunkirk, N. Y.

THE ROCKAWAY BEACH HOSPITAL, of Rockaway Beach, N. Y., is now equipped with an auto ambulance, which was purchased by means of a novel subscription plan.

RUTLAND, VT., is experimenting with a commercial car for use in re-surfacing roads. So far the truck has saved from $2 to $4 per day, and has done three times the work of the horse apparatus.

KANSAS CITY, MO., in the process of putting all her municipal vehicles on motor trucks, has received two new motor car ambulances from the Peerless Motor Car Company, of Cleveland, Ohio.

TERRE HAUTE, IND., city officials, after an investigation, have placed an order for a Franklin police patrol, and within three years intend to replace all fire and police horse-drawn vehicles with motor apparatus.

THE HARRISBURG, PA., ARSENAL has purchased a commercial car for use in hauling the National Guard supplies from the State arsenal to the railroad siding. The car is of one-ton capacity and will entirely displace the horse drawn vehicles.

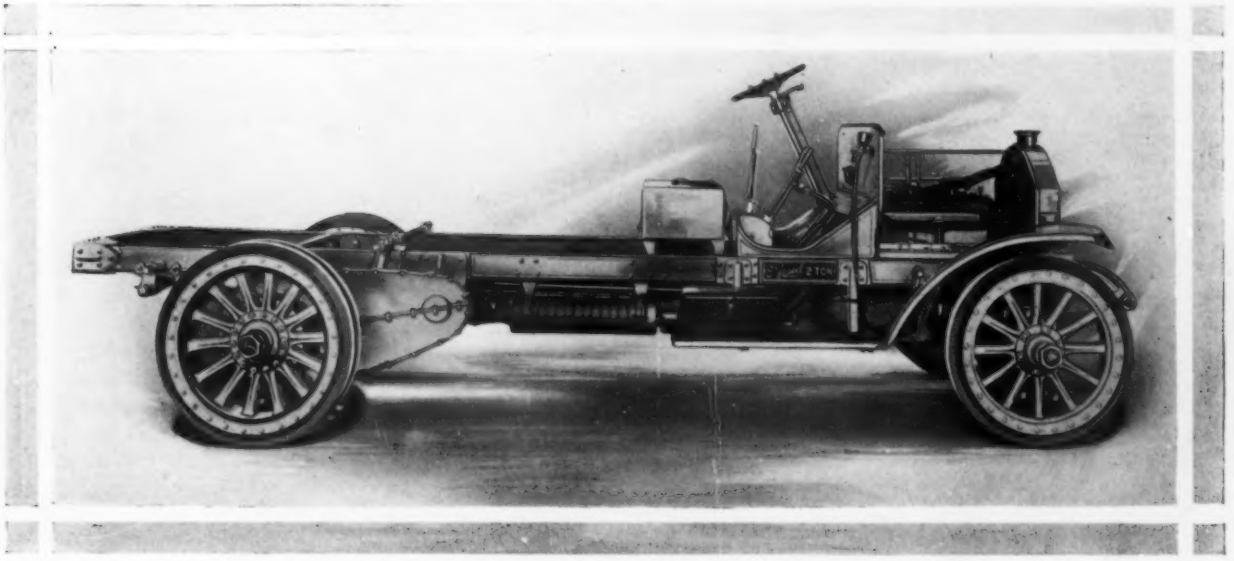
THE CITY OF MILWAUKEE, WIS., is making a thirty days' trial of a combination chemical and hose truck, built by a local company, and this will be the first piece of motor-driven fire apparatus that Milwaukee will own, although the chiefs all have touring cars or runabouts.

THE CITY OF INDIANAPOLIS, IND., has contracted with the State Automobile Company for two Reo motor trucks, for the use of the city engineer and his assistants.

The trucks are of 1,500 lb. capacity, with seating space for four passengers, besides room for carrying their supplies and instruments. The new trucks will eliminate considerable expense of the department, as it is said they can be maintained and operated much more cheaply than horse-drawn wagons. The city paid $750 each for the trucks.

The Rapid One and Two-Ton Trucks

THE Rapid Motor Vehicle Company, of Pontiac, Mich., well-known pioneer makers of trucks, have for over two years been developing the one and two-ton, four-cylinder trucks, which they are now marketing. These machines are the result of many years of truck business of the Rapid Company, combined with what they consider the best foreign practice of the day. Briefly, it may be stated that in the design, one of the chief considerations is the placing on the market of a truck which will overcome, by means of its construction, the results due to the abuse the average driver, in practice, puts upon the commercial vehicle. One of these abuses is overspeeding, not only of the motor but of the car. This has been taken care of by making the motor a comparatively low-speed, long-stroke engine and fitting the same with a governor, which limits the speed of the machine to 13 m.p.h. This governor also acts as a fuel economizer. The other abuse which has been guarded against is that of overloading. This is accomplished in two ways: first, by throwing a greater percentage of the load on the rear springs by making these rear springs very long and heavy; and by using a cross auxiliary spring, together with a forward large dual tire equipment, for a truck of this capacity. Especial attention has been paid to the factors of carelessness and inattention on motor trucks, especially in severe service; for instance, many times, in driving a heavily loaded truck over uneven surfaces the vibration distorts the radiator and shakes apart the tubing connections. This is overcome in the Rapid by mounting the radiator on flexible springs in such a manner that it is unaffected by the frame twisting, and unharmed by road vibration. Ease of inspection and repair has been given tests, as it is realized that the difficulty of getting at parts needing adjustment oftentimes discourages the driver or caretaker in giving the affected parts attention. In the Rapid the ignition apparatus can be entirely taken off in three minutes, the transmission can be taken out of the car completely, as a unit, by disconnecting four points. The entire lubricating system can be removed by loosening three bolts. Heretofore, one of the serious causes of trouble in this type of engine has been due to the presence of dirt on the push rods, from which point it worked down into the lubricating oil in the crank case, and, as a consequence, every part lubricated was being affected continually by the presence of fine particles of grit. This, in time, resulted in serious difficulty, as the affected parts soon became unfitted for their various duties, and loss of power resulted.

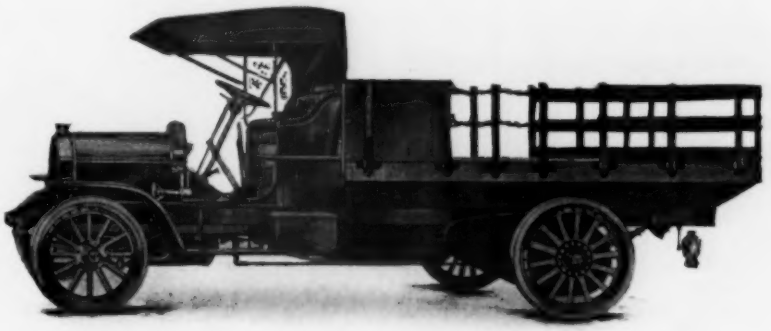


The Rapid Chassis, Side View

No sod pan is used, but all parts are protected by shields; a differential lock is used; motor cast en bloc. Price of chassis, $2750

Owing to the necessity of a motor truck operating at its full capacity under varying weather and road conditions, a four-speed transmission gear is employed, experience showing that this results in the driver being able to practically maintain the same daily mile schedule under normal conditions. The driving parts are reduced to a minimum by protecting every bearing surface in the entire vehicle with oiltight members; for instance, the chains are covered completely, and they run continuously in an oil bath. No sod pan is employed underneath the car where lubricating oil and gasoline may collect. The flywheel is encased in an aluminum housing, which prevents the oil being thrown over the neighboring parts. The troubles due to the differential on a motor truck working on slippery streets is overcome by what is known as a differential lock, operated by a foot pedal, to the driver's right. When pressure on this pedal is released the lock is inoperative, so that it is impossible for the car to be continuously operated without the differential; the value of this appliance is especially well demonstrated in cities having unpaved side streets and

alleys, which are oftentimes very muddy while the main thoroughfares are in excellent condition. The comfort of the driver has been considered as an important factor in motor truck operation, owing to his having to handle from two to four times as much goods as the horse and wagon delivery. The Rapid employs very comfortable leather seats, with a Pullman back. It is very low, in fact, can be reached by two short steps from the ground. By employing a left-hand drive, the seat is accessible from either the left or the right-hand side. Putting the driver on the left-hand side has the added advantage of allowing him to gage more accurately the proximity of the passing vehicles, which are always on his left. The steering gear is set at the same gage as a few of the well-known pleasure cars, so that the operation of the car is under the most comfortable conditions. All of the fittings are aluminum, which overcomes the annoyance and expense of decaying rubber or linoleum. The lighting system is a combination of coal oil and electric light, for which a special lighting battery is supplied.



The Rapid Two-Ton, Four-Cylinder Truck; 4 in. bore, 6 in. stroke; engine fitted with governor. Loading space 10½ ft., back of seat

The Motor

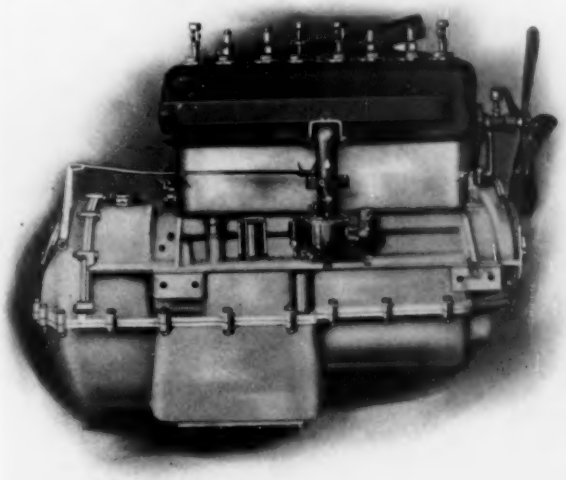
The engine on the one and two-ton trucks are of the same general design, the one-ton having a bore 5½ in., stroke 5¼ in., and the two-ton having a 4 x 6 in. cylinder. These motors are cast en bloc. The cylinders are of the L-type, the valves on the right; all valve mechanism is enclosed by a pressed-steel housing, the inlet and exhaust manifolds being cast integrally with the cylinders. The jackets are integral, all open into each other from end to end. The water circulation is from a bronze-housed centrifugal pump at the left, shaft-driven from the half-time gear train, an Oldham coupling being interposed in the shaft. The rear extension of this shaft has a notched plate engaging a pin in a plate of similar diameter, thus driving the strap-mounted, Bosch high-tension magneto; this plate and pin arrangement giving an opportunity for timing and quickly removing the magneto. At the forward end of this shaft an aluminum pulley drives a six-bladed steel fan, which is ball-bearing mounted and driven by a flat leather belt. The crankshaft is mounted on three Parsons' white brass bearings. The cam shaft is of high-carbon steel, with eight integral cams, and is mounted in white brass bearings. This cam shaft is removable through the front without dropping the lower half of the crank case. The crank case has integral webs, which form a protecting pan, and is supported on a channel-section, structural-steel subframe.

Water Cooling

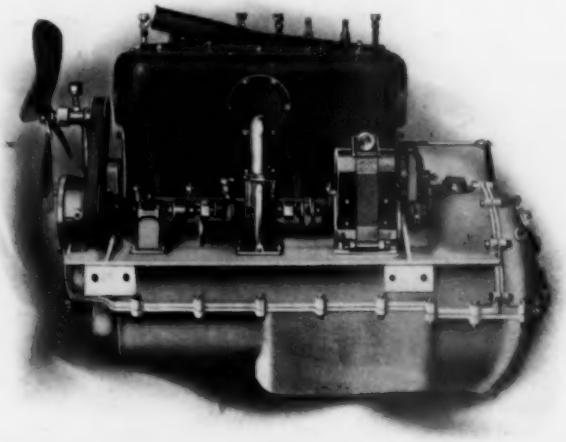
The vertical tube radiator is mounted forward and is protected by a tubular cross member in front of it. The cap is very large, elliptical in shape, and the stretcher has a large filler in it, so that a supply of water can be pumped into it very readily while on the road. A short bronze pipe connects the water pump to the jacket, by means of a plate some 5 in. in diameter, the removal of which forms a drain for the water jacket. At the outside of the engine a gland deflects the water to each end, giving the proper circulation. The flywheel is mounted on an integral crankshaft and contains within it a flywheel governor, which is connected by links to the throttle between the carburetor and engine, acting on the mixture. Ignition is by Bosch dual system.

Oiling System

The oiling system is the reverse-feed, plunger type, operated by a shaft connecting with the cam shaft. A



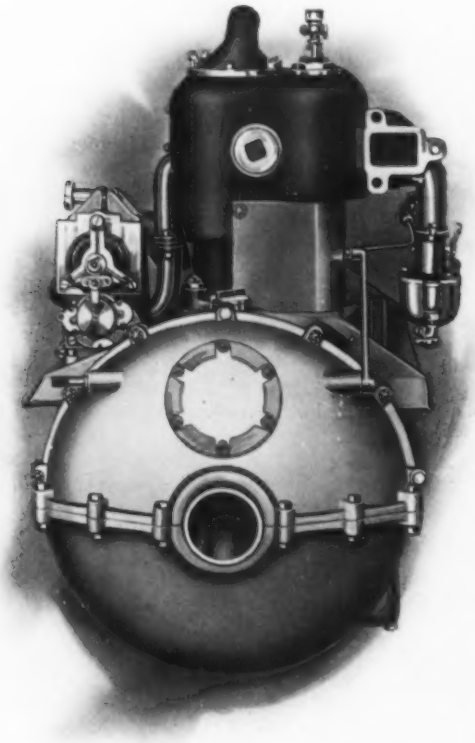
Magneto Side of Rapid Motor; all valve mechanism encased. En-bloc cylinders; very compact.



Rapid Motor, Carburetor Side. These motors are rated at 20-23 and 25-30 h. p.

splash lubrication is not employed, as each bearing and piston is supplied with a stream of oil under pressure, the overflow being carried back to the oiler, strained three times, and repumped to the bearing surfaces of the motor.

The oil pipes, to which considerable damage is often done in the ordinary type of engine, owing to their being



Rear of Motor; showing the flywheel encased by an extension of the crank case

exposed, are inside of the crank case, protected from any possible injury that might happen owing to their being struck or bent, and thereby causing a stoppage of the oil flow.

Every frictional surface in the entire car, from the front springs and starting crank to the spring set on the rear axle, is supplied with oil cups, so that lubrication of these parts is made easy.

Transmission Change Gears

The transmission of the Rapid four-cylinder truck is carried in an aluminum case. It is of selective sliding-gear type, providing four speeds forward, with direct drive and one reverse.

The gears are of chrome nickel-steel, specially heat-treated. Both the main shaft and countershaft are made of 45 degree carbon steel, specially heat-treated, and are mounted on ball bearings. The end thrust of the driving shaft is sustained by a large ball bearing, so as to avoid imposing the combined thrust and radial load on any one bearing.

The jack shaft is incorporated with the transmission, as is also the clutch, making an exceedingly compact suit. The jack-shaft spindles are of 45 carbon steel, properly treated.

The differential is of the bevel-gear type, all gears being 3½ per cent. nickel-steel, and oil-tempered. An unusual and extremely valuable feature of this transmission is a differential lock, which permits the operator to lock the differential in such a manner that both halves of the jack-shaft spindles are locked together. This gives a positive drive to both rear wheels, enabling the operator to negotiate awkward and slippery places on the road.

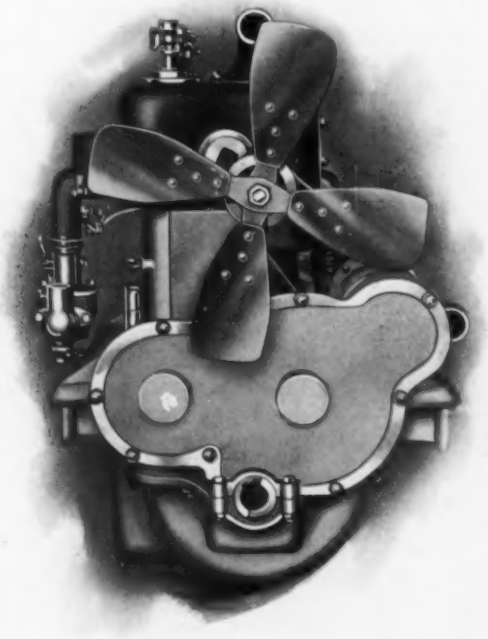
Clutch

The clutch is unique, and has several advantages peculiarly its own. Being a part of the transmission, it is contained within the transmission case, and is unusually well protected. It is of the multiple-disc type, the discs being hardened ground steel to bronze, and readily adjustable. A small brake is provided on the release lever, the function of which is to guard against the clutch spinning when disengaged, and also to facilitate changing from one speed to another.

Suitable inspection plates are provided, which give ready access to the gears and clutch. Accessibility is further afforded by the three-point suspension used on the transmission. Should occasion require the removal of the entire unit, it may be easily accomplished in a very few minutes.

Drive

The drive from the jack shaft to the rear wheels is by means of double roller chains, which run in oiltight casings. This method is a great advance in construction over side-



Front of Motor; showing the fan and the complete housing of the half-time gears

chain drives commonly used, where chains are exposed to dust and dirt. The utmost economy in chain wear is ensured by this chain case, which is cast in three separate pieces. The inner sections are of steel, and they act as radius rods, being equipped with an eccentric adjustment and necessary universal joints to compensate for the different relative positions of the rear axle and jack shafts on uneven roadways. The aluminum outer covering is constructed in two pieces, allowing immediate access to chains.

Front Axle

The front axle is made in one piece, of the I-beam type, with large spring pads made integral with the main axle

body. This gives a most rigid and efficient spring support, allowing the use of more flexible springs, high road clearance and a more graceful appearance.

Rear Axle

A bevel gear differential is used, each gear being treated the same as those in the transmission. A nickel-steel jack shaft and nickel-steel rear axle are used, providing a maximum strength at minimum weight. Internal and external brakes, operating directly on the rear hubs, are used, none being employed on the jack shaft, which relieves the differential, the differential gears and driving chains from the braking strain. Especially designed heavy duty truck wheels, 36 in. in diameter, are used, and on these are mounted dual tires, 3½ in. in width. The front wheels are 34 in. in diameter, upon which are mounted 4 in. solid tires. All tires are of the quick-detachable type, making replacement easy.

Long, broad springs of large camber are mounted on wide spring seats. Flexible mountings are used at each end of the rear springs and the rear ends of the front spring. An auxiliary spring is placed over the rear axle, where it absorbs the shock during especially severe road work and at the time an overload is carried. This spring does not operate until the truck is loaded to eighty per cent. of its rated capacity. As a result, the car is suspended freely when carrying a light load.

Price and Bodies

The one-ton rig sells for $2100, and the two-ton size for $2750. Any special kind of body will be made to order by the Rapid Company. The prices thereon vary in proportion, according to the need of the users. Standard equipment includes oil and electric lights, lighting battery, odometer, full tool equipment, jack, trouble lamp and a one year guarantee.

Pope-Hartford Commercial Cars

The Pope Manufacturing Company, of Hartford, Conn., has announced its new three-ton trucks which it is now building. The motor is the vertical type with four cylinders, is water-cooled and develops 40 h. p. It is located on the forward end of the chassis under the driver's seat. The machine is geared to run 12 m. p. h., but other gearing can be furnished if desired.

The lubrication is by means of a mechanical oiler located on the crank case with a large suction pump and stand pipe, which is used as an overflow, permitting oil, when it reaches the level of the stand pipe, to run back through the stand pipe into the crank case. The crank case proper is provided with stand pipes, fitted with gauze strainers, to maintain at all times a predetermined oil level in the case. Oil is pumped from the oiler to the cylinders, and the main bearings are lubricated by splash from the crank case. Rear axle is lubricated by splash, with pet cocks fitted into the axle to maintain the proper level of oil. The transmis ion is lubricated by splash. All other parts are provided with oil or grease cups wherever necessary.

Pope-Hartford Three-Ton Truck Loaded with Groceries

The truck is powered by a 4-cylinder, 40 h. p. water-cooled motor; 125" wheel base; 36 x 5" front tires single and 36 x 4" dual rear. The price is $3,400. Different styles of bodies can be furnished.

The clutch is of the cone type with a leather face and cork inserts. The transmission gear set is of the selective sliding variety, provided with three speeds forward and reverse. The final drive is by double side chains from the jack shaft to the rear wheels, which are fitted with 36 in. Firestone Demountable rims and Timken roller bearings. The front tires are 36 x 5 in. single solid and the rear 36 x 4 in. dual solid.

The springs are semi-elliptic in front, 44 in. long and 3 in. wide. The rear springs are semi-elliptic, with cross springs over the rear axle to provide for overload and are 50 in. long. The wheel base is 125 in. and the tread 68 in. The front axle is a solid I-beam forging, the rear one being of the same material.

The steering wheel is 22 in. in diameter, and is located on the left. Three sets of brakes are provided, contacting bands on each end of the jack shaft, 10 in. in diameter and 2 in. face; contracting band on transmission shaft, 12 7/10 in. in diameter by 2¼ in. face—these two brakes being operated by foot pedals, and an emergency brake operated by a hand lever operating on rear wheel drums, which are 18 in. in diameter with a 3 in. face. Road clearance 13 in.

The frame is 5 in. rolled channel section steel. The standard body furnished is platform and stake, 12 or 14 ft. long, 6 ft. wide and 46 in. from the ground. Special bodies can be built at special prices. The gasoline tank has a capacity of 17 gallons and is located under the driver's seat.

The equipment consists of two side oil lamps, one rear oil lamp, horn, complete set of tools and tool box, hub odometer, five-ton jack, top and storm curtains covering driver's seat. The price is $3,400 f. o. b. Hartford, Conn., complete—painting and ordinary lettering included in this price.

INSTRUCTIVE EXPERIENCES

NEW YORK TO BOSTON WITH TRUCK IN TWENTY HOURS

Another incident which demonstrated conclusively that motor trucks have reached a point where the factor of possible mechanical trouble may be disregarded, is shown by the consistent performance of a Pierce-Arrow five-ton truck, worm driven, which recently made a trip between New York and Boston in 20 hours flat. It was the first long distance tour of any kind completed by a worm driven car in this country. Not a tool touched during the entire run and during the following week the truck was demonstrated in Boston.

The truck was loaded to its rated capacity. One run was made by way of New Haven, Hartford, Springfield and Worcester. The odometer registered 242 miles, which makes the average speed maintained 12.1 m. p. h. In all 51.5 gallons of gasoline and 6 pints of lubricating oil were used, an average of 4.7 miles to the gallon of gasoline and 40 miles to the pint of oil.

Pierce-Arrow Commercial Car After Arrival in Boston

The start was made from New York at 2 o'clock in the morning and at 8.30 A. M. the truck, carrying 20 barrels of lubricating oil, was in New Haven. A stop of an hour was made there and the truck then went on to Hartford where between four and five hours were spent in demonstrating before the road trip was resumed. Springfield was reached at 7.30 in the evening. At 5.30 the next morning the start for Worcester was made. After an hour there the last leg of the journey was begun and the truck drew in at Boston at 3. P. M., the running time having been exactly 20 hours. Had there been no demonstrating done at any of the places along the route the truck could have reached Worcester early in the evening of the first day out and the run to Boston completed during the evening or by noon, Saturday.

Commercial cars are being used for hauling supplies for operating camps in the various oil fields throughout the state of California.

EFFICIENCY OF MOTOR SPRINKLERS

The report of the engineer of a New England street sprinkler company on the comparative cost of horse and motor equipment for street sprinkling was quite interesting. It showed that one five-ton motor truck would be capable of doing the work performed by five horse drawn sprinklers, and at the same time cutting the cost in half. The following is a condensed form of the report:

For horse drawn sprinklers, figures as given total $454 per mile per year of 225 days—covering the ground at an average of four times a day. In other words this mile is covered approximately 900 times for $454, or about 50 cents for each mile traveled. Figuring on a basis of amount of water delivered and ground covered per hour, the horse-drawn sprinkler, in taking 750 gallons in five minutes and discharging it in ten minutes, delivers to the road 3,000 gallons in 1 hour and travels 2½ miles.

Could provision be made for taking in the water from the same size hydrant as is used to fill the trolley sprinkler—about 1,200 gallons per minute—and a distributing nozzle provided capable of delivering to the road 400 gallons per minute—the capacity of the motor sprinkler would be as follows: Allowing one minute for filling and three minutes for taking in and discharging 1,200 gallons of water would be the disposing of 14,400 gallons of water in one hour—just 4½ times the present capacity of the horse drawn wagons.

In doing this the automobile would run at about 6½ miles per hour— for 40 minutes each hour—or would cover about 4 1-3 miles each hour, making the total distance in 10 hours 43 1-3 miles.

The automobile would sprinkle double the surface covered by a horse drawn vehicle every time it went over the ground and would run 2½ times as fast. Therefore, one auto sprinkler would replace five horse drawn sprinklers, and cut the cost practically in half.

TRUCK PAYS FOR ITSELF WITHIN YEAR

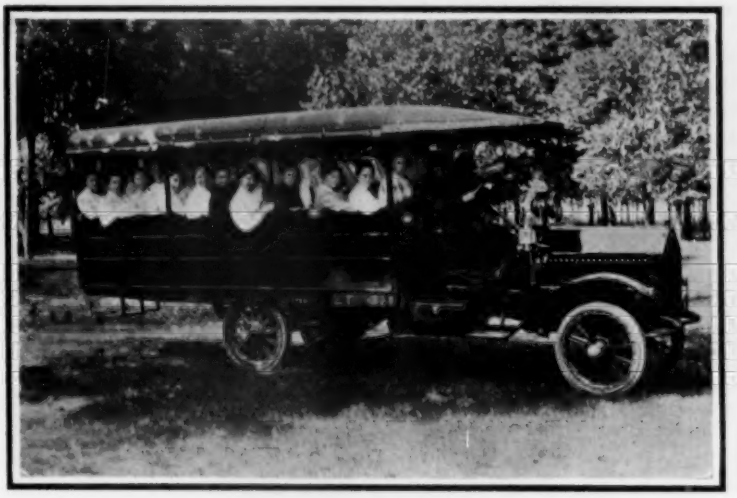
C. S. Richardson, manager of the Reliance Automobile Company, of San Francisco, Cal., during a recent interview cited an example where a Knox five-ton truck paid for itself in less than a year, or to be exact, 346 days.

A general trucking company had a contract with a large city to haul an average of 48 tons of garbage three miles from the city to the municipal reduction plant. For many years this work had been done with horses and very careful figures kept of the actual cost of operation. To do the work successfully, it required five two-horse teams of three-tons capacity each, making three round trips per day. This arrangement averaged a total daily cost for the five teams of about $30.

Believing they could reduce this expense considerably, the company purchased a Knox five-ton truck about a year ago. Very careful records kept of the cost of operation showed surprising results. After liberal allowances were made for tire repairs, depreciation, wages, etc., the daily cost of operation figured less than $15. This single truck has been able to move the entire 48 tons of refuse in each working day of 10 hours, thus supplanting five horse drawn trucks and four drivers.

EVANGELISTS USE THREE-TON COMMERCIAL CAR

That the efficacy of the commercial car is appreciated even by the Evangelists is apparent from the accompanying illustration, which is that of a three-ton Lambert friction-drive car in use by a religious sect at Anderson, Ind. The vehicle is used for gospel purposes, as will be noted from the photograph, and also for the transaction of the business of the order, which does a vast amount of printing, having a big plant. When the car is not used for meeting purposes it is kept on the move hauling printed matter and the like. The car has been in use for a short time and has worked out very well.



Lambert Three-Ton Friction-Drive Car, in Use by a Religious Sect at Anderson, Ind.

REO WINS IN WESTERN CIRCUIT

In the recent Los Angeles-Examiner endurance contest the Reo truck, entered by Leon T. Shettler, was among the winners, and in gasoline and oil consumption the Reo won its class by a handsome margin, having used three and one-half gallons of gasoline less than its nearest competitor, besides carrying nearly 100 lbs. greater load. The contest lasted three days and covered 165 miles.

The Reo's time was thirteen hours and fifty-three minutes, or an average of eleven and nine-tenths m. p. h.

The cost per ton per mile for gasoline and oil was only three and three-tenths cents, and that on the basis of gasoline at 20 cents per gallon and oil at 64 cents per gallon.

COMMERCIAL CARS USED BY LIBRARY

Six one-ton trucks are used for the collection and distribution of books in the Chicago Public Library. These trucks have been in use for several years, and have averaged thirty-five miles a day. The depreciation has been figured at twenty-five per cent., giving each car a life of four years. The cost of maintenance and operation is $10,846 a year, or about six dollars a working day per truck. Ten horses and five extra drivers were required previously for the work, allowing twenty miles a day as the horses' capacity the year around. The saving alone amounted to about twenty-five hundred dollars a year, besides doing away with the necessary reserve horses and keep cost. This is one of the most positive pieces of evidence yet adduced that the merchant or manufacturer who sticks to the horse trucks is not only lacking in progression, but is losing money.

COMMERCIAL CAR IN FORESTRY WORK

The invasion of the commercial car into the forest is another evidence of the horse being routed from a domain in which in the past the commercial vehicle was excluded. Like the motor car supplanting the broncho on the Western plains, there is something romantic in the way the gasoline truck has struck into the wilderness, hauled immense loads of rough timber over the rugged lumber trails, and carried full capacity loads to railroad sidings and sawmills.

In the New Hampshire hills, in the vicinity of Nashua, there is a lumber industry, and the tract of timber land, if not one of the greatest in New England, is representative of conditions which the motor truck must meet, and the recent introduction of a truck is interesting and significant. The nature of the work, both as to conditions of travel and loading and unloading, is different from that ordinarily performed by trucks, yet the results have exceeded expectations.

While the commercial motor vehicle is now making a worthy appeal to the business man, it must, unlike the pleasure car, overcome serious obstacles, particularly the neglect and abuse it is subjected to by the average business firm. Confidence in the reliability of the well-built pleasure car has made the business man and merchant somewhat apathetic with reference to their trucks. The absence of accurate knowledge as to exact operative cost or operative performance has kept the motor truck somewhat in the background, but its value is now rapidly becoming known and appreciated.

The single gasoline fire engine of the St. Louis fire department has proved so economical and efficient that another will be ordered in the near future.

LARGE FURNITURE HOUSE PRAISES COMMERCIAL CAR

George B. Plummer, superintendent of delivery for J. B. Van Sciver & Co., an immense furniture house of Camden, N. J., said in a recent interview concerning the economic advantage of the motor truck:—

"We have been using the motor truck now for about five years. It has become of service to us to such an extent that we could not possibly do without it. We have found that two three-ton trucks have taken the place of sixteen horses and five wagons. They have increased the radius of our delivery, with Camden as a centre, from fifteen to over sixty miles.

"Before we began using the commercial car a day's journey was fifteen miles and return, making a total of thirty miles. We now go and return with the commercial car in one day to such places as Altantic City, Trenton, Chester, Wilmington and Lancaster.

"Persons from a distance have come into our place of business and said to us, 'We have seen your trucks out our way, and we want you to deliver some goods to our home.' Only recently a customer from Elizabeth, N. J., placed a large order with us, simply because he had seen our motor trucks passing through his city.

"The difference in the cost of delivery between the horse-drawn vehicle and the modern motor truck is also very great. At the present time we can furnish an Atlantic City buyer at a cost of from eighteen to twenty dollars delivery charges enough material to furnish an eight or nine-room house. This cost includes wear and tear on the machine, packing the goods, gasoline and the wages of two men who accompany the car on the trip.

"By the old horse and wagon method, which would include the packing of a wagon, hauling to the station, unpacking and placing in a car, prepaying the freight, etc., etc., the same delivery would have cost us some fifty-odd dollars.

"Another decided advantage which we have derived from the use of commercial cars is the lack of medical treatment to our horses. We have not had a veterinary surgeon in our stables more than twice in the past five years. Our horses are lasting longer because they are now used only on short trips. For this reason we get more than 50 per cent. more service from each animal.

"Our transportation equipment at present consists of four three-ton commercial cars and twenty-eight horses and ten wagons."

This is only one out of many interviews which might be had to the same effect. Business men in every community are sooner or later going to put in a commercial car. It is simply a question of time. The proposition is that when apparently every day means a loss of time and money through a greater cost of operating horses and wagons, and also through the failure to get more business on account of not being able to make quick deliveries, how long are the merchants and manufacturers going to force themselves to accept this daily loss?

COMMERCIAL CAR LINE FOR KANSAS CITY

Expecting to give successful competition to the street railways, a company of Kansas City, Mo., men who are still keeping their plans under cover, have organized a company for the establishment of a motor car passenger line. The line will operate across town for sixty blocks, paralleling one of the principal trolley divisions.

Forty passenger cars will be used and enough of them will be in commission to enable the motor line to meet the two-minute schedule of the street railway. Five-cent fares will be charged, stops will be made at every corner until a car is full, after which it will go straight through until stopped to permit passengers to disembark. The trip time will reduce that of the trolleys by eight or ten minutes.

This experiment is distinctly new, in that it proposes to meet trolley schedules, and business men who have been informed of the plans of the new company are wondering what will be the ultimate effect upon the value of street railway franchises. If the preliminary project is the financial success that is expected, the promoters will be prepared to give the street railways competition at all points.

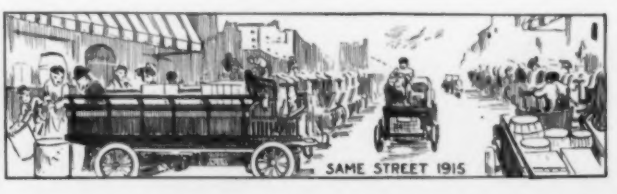
BREWERS USE COMMERCIAL CARS TO DELIVER IN "DRY" TERRITORY

The brewers, distillers and wholesale liquor dealers of Missouri are just now asking themselves why they did not think of motor trucks before. The activity of the Kansas officials in enforcing the prohibitory liquor laws and the delays in deliveries by express and freight have sadly embarrassed Missouri liquor dealers who do a large private order business in the adjoining "dry" state. The problem has been solved, however, by the use of motor trucks.

Just across the state line from Fort Scott, Kan., a Missouri company has erected a large liquor warehouse and installed a garage which accommodates four or five large light-running motor trucks. Orders for beer and stronger liquors are taken by mail, telegragh and telephone from a dozen large towns in Southeastern Kansas and delivered by motor truck the same day. Heretofore, the thirsty have been compelled to wait two or three days to get their liquors by rail, and then often had to pay for deliveries from express offices. Now the motor truck delivers the wet goods to the door of the city man and farmer alike. This is the most comprehensive delivery scheme yet worked out by any commercial concern in the Southwest.

WARREN & COMPANY, furniture movers, of Boston, Mass., have in commission a truck which in a short time has covered 35,000 miles and has visited every part of New England. The truck is doing work which could not possibly be done by horses, and is competing favorably with the railroads in long hauls.

TO INCREASE the efficiency and economy of their motor vehicle delivery departments, several New York merchants find that it pays to give monthly prizes to the drivers making the best records.



The Worm Gear as Applying to Motor-Driven Vehicles

BY E. R. WHITNEY*

THERE seems to be a popular impression, and, I am sorry to say, among some engineers as well, that the worm gear is a device that is all right for an elevator, a mechanical motion, or for a steering device where irreversibility is desired, but that it is not to be considered seriously for the driving gear of a motor car or truck. The idea seems to be a single-thread worm having a spiral angle of five to ten degrees and an efficiency of twenty-five to fifty per cent. We often hear questions like these: Will it coast? Will it drive backwards? Is the efficiency high enough for automobile work? Does it wear out rapidly?

Worm Gear Superior in Its Field

Contrary to the opinion expressed by writers from time to time, and especially by several writers recently, the worm gear, within its legitimate field, is superior in many respects to other forms of gearing. It has its limitations, and is not applicable to all conditions, but I will endeavor to show in this paper that for certain classes of motor-driven vehicles it is superior to other devices, on the score of efficiency, durability and simplicity.

The efficiency of a worm gear is a function of the thread angle and the coefficient of friction. The coefficient of friction is a function of lubricant and the nature of the bearing surfaces.

Efficiency

The relation of the thread angle to efficiency may be expressed as the amount of sliding between the surfaces for amount of useful work done.

Frederick A. Halsey, in a work on the subject, has expressed this relation very clearly, and I cannot do better than to quote his words:

"The reason why an increase of pitch, other things being equal, or, in other words, an increase of the angle of the thread, gives higher efficiency will be understood from Fig. 1. If AB be the axis of the worm and CD a line representing a thread, against which a tooth of the wheel bears, it will be seen that if the tooth bears upon the thread by a pressure P, that pressure may be resolved into two components, one of which, EF, is perpendicular, while the other, EG, is parallel to the thread surface. The perpendicular component produces friction between the tooth and the thread. The useful work done during a revolution of the the thread is the product of the load P and the pitch of the worm, while the work lost in friction is the product of the perpendicular pressure EF, the coefficient of friction and the distance traversed in a revolution, which is the length of one turn of the thread. Now, if the angle of the thread be doubled, as indicated, the load P remaining the same, the new perpendicular component FH of P will be slightly reduced from the old value EF, while the length of a turn of the thread will be slightly increased. Consequently, their product and the lost work of friction per revolution will not be much changed. The useful work per revolution will, however, be doubled, because, the pitch being doubled, the distance traveled by P in one revolution will be doubled; for a given amount of useful work the amount of work lost is therefore reduced by the increase in the thread angle, and, since the tendency to heat and wear is the immediate result of the lost work, it follows that the tendency is reduced. For small angles of thread the change is very rapid, and continues, though in diminishing degree, until the angle reaches a value not far from forty-five degrees, when the conditions change and the lost work increases faster than the useful work, an increase of the angle of the thread beyond that point reducing the efficiency.

"This general consideration of the subject shows the principles at the bottom of successful worm design, but a more exact examination is desirable. According to Professor Barr, the efficiency of a worm gear, the friction of the thrust bearing being neglected, is:

$$e = \frac{\tan a\ (1 - f \tan a)}{\tan a + f} \text{ (approximately)}$$

in which

e=efficiency.

a=angle of thread (being the angle $D\ F\ I$ of Fig. 1).

f=coefficient of friction.

"This formula gives no clear indication of the manner in which the efficiency varies with the angle, and the diagram, Fig. 2, has been constructed to show this to the eye. The scale at the bottom gives the angles of the thread from 0 to 90 degrees, while the vertical scale gives the calculated efficiencies, the values of which have been obtained from the equations and plotted on the diagram. In the calculations for the diagram it is necessary to assume a value for f, and this has been taken at .05 and .025. The

* Paper read at the Summer Meeting of the Society of Automobile Engineers at Dayton, Ohio, June 15-17, 1911.

calculated efficiencies from these values are shown in the lower and upper curves respectively. The experiments made by Mr. Wilfred Lewis for William Sellers & Company showed an increase of efficiency with the speed. The present diagram may be considered as confined to a single speed, and at the same time is not to be understood as showing the exact efficiency to be expected from worms, but rather to exhibit to the eye the general law connecting the angle of the thread with the efficiency."

Test of Hindley Gear

Fig. 3 is the plotted result of an efficiency test on a set of Hindley worm gears as used in the Commercial Truck Company's 1000 lbs. electric delivery wagon. The data on these gears is as follows:

Pitch	0.96 in.
Lead	3.84 in.
Ratio	$9\frac{3}{4}$: 1
Center distance	6.796 in.
Angle of thread (average)	28 degrees
No. threads in worm	4
No. teeth in gear	39
Diameter of worm	2.8 in.
Diameter of gear	11.917 in.

The test was made on a stock rear construction, the load being taken on a specially constructed Prony brake. The brake drum was mounted on a shaft with a square end, passing through the square holes in both gears of the differential. The torque values were taken by a platform scale.

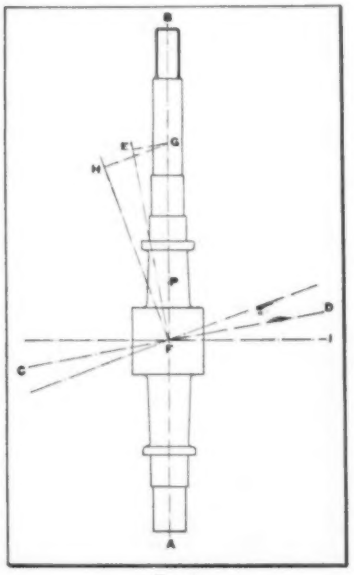


Fig. 1

The worm gear was driven by the electric motor, which is a standard series-wound automobile type motor, and which has a normal rating of 85 volts, 22 amperes, 1,200 revolutions per minute. Brake tests were first made on the motor, and before starting the test for efficiency, observations were made at various loads to determine the effect of varying the voltage and consequently the speed; it was found that the torque values on the Prony brake measuring the output of the gears was practically constant for a given current, with a considerably wide range of voltage and speed.

It is interesting at this point to note this fact in view of the results obtained by other experimenters, they having found a decided change in the efficiency with changes in speed. This may possibly be accounted for by the much higher surface speed of gears in this test, ranging from two hundred to eight hundred feet per minute.

The fact that the voltage and speed could be disregarded greatly simplified the test, as it was then necessary to observe only current and torque, the efficiencies being calculated directly from the torque tests on motor and gears.

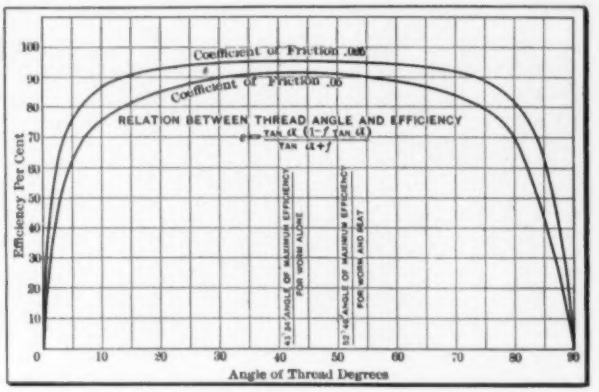


Fig. 2

The curve of gear torque, Fig. 3, is plotted from torque values on the worm gear, divided by the gear ratio. The speed curve shows the motor speed at eighty-five volts with varying loads.

The test corresponds to actual service conditions with the wagon and full load, working through a range of from a slight down-grade to about an eighteen per cent. up-grade. The maximum efficiency of ninety-three per cent. corresponds to a coefficient of friction of .032.

Durability

The durability or life of a worm gear is a direct function of efficiency and it follows that if a gear is produced that is high enough in efficiency throughout the full load range to be practical it will also be satisfactory for durability.

The Commercial Truck Company's first worm-driven wagons were put into service about two years ago. Some of the first wagons have now covered approximately twenty-five thousand miles. Recent examination of the gears showed very little signs of wear. I would conservatively estimate the life of these gears at from fifty to sixty thousand miles.

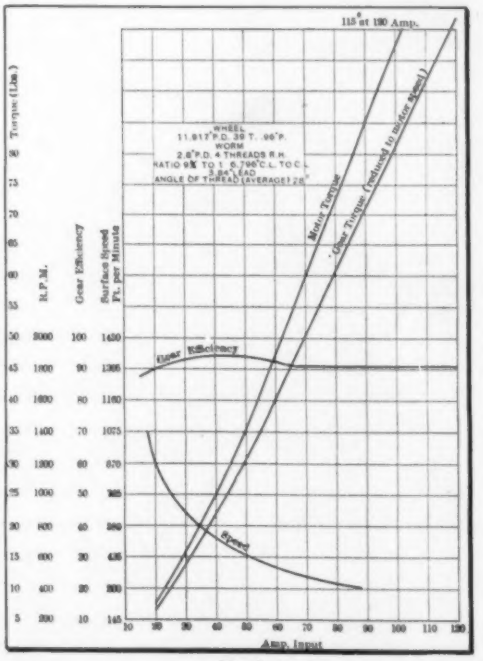


Fig. 3

The worm-gear drive is not a cheap device, and the results as indicated above for efficiency and durability cannot be expected unless the gears are properly designed, constructed of the best materials and accurately mounted on high-grade antifriction bearings. Unless facilities are at hand for doing accurate machine work, the use of the worm-gear drive had better not be attempted, but once properly constructed and mounted it is practically as free from trouble as a pair of spur gears. The gears are mounted on fixed centers and with no provision for adjustment.

Theory and Practice

The Hindley worm gear is much more expensive than the straight type, but the superior bearing between the worm threads and gear teeth, and the greater durability warrant the additional expense. The Commercial Hindley gear is a decidedly different product from the so-called theoretically correct Hindley gear, and in practice the writer has experienced none of the fancied difficulties in mounting accurately enough in the direction of the worm shaft to meet all practical requirements; in fact, much less accuracy is required in this direction than is required at right angles to the shaft with the straight worm.

There is no such thing as a so-called theoretically correct Hindley gear; that is, the threads of the worm do not have a full bearing against the whole area of all gear teeth in mesh, but the Commercial Hindley gear approaches very closely to this condition.

Relative Efficiency and Field

Some engineers claim that even in ratios that can be covered by a single reduction bevel gear the worm has advantages in a high-grade car in being much easier to make silent and has nearly equal efficiency. The efficiency is undoubtedly lower than with a single reduction bevel gear made with equal accuracy and equal mounting, but is considerably higher than a double reduction bevel and chain or chain and chain. We will assume that the legitimate field for the worm gear is only where its efficiency and durability are equal to or better than in the case of other devices to do the same work. Then, keeping in mind the principle underlying efficiency, the requirements for road clearance, etc., it would on this basis be limited to ratios of from about 6 : 1 to 14 : 1. These limits are an approximation only and are subject to modification, depending on exact conditions.

In order to put in convenient form the comparison of all features of the worm gear with other forms of gearing, Table No. 1 has been made up. In consulting this table it must be understood that the comments on the different ratios are not unalterable, although they are approximately correct for the usual form of construction.

Table 1. Comparison of All Features of Worm Gears with Other Forms of Gearing

Gear Ratio	Lower Than 6:1	6:1 to 14:1	Higher Than 14:1
Other forms of gearing	Single reduction bevel	Double reduction Bevel and Chain Chain and Chain	Double reduction (Only required on heavy electric trucks) Bevel and Chain Both chain Both spur
Efficiency	Lower	Higher	Lower
Durability	Equal or Better	Better	Equal or Better
Noise	Equal or Less	Less	Less

Legitimate Field for the Worm Gear

Table No. 2 has been drawn up to give some idea of the requirements for gear ratios with different types of motor-driven vehicles, and to indicate where the worm gear is applicable.

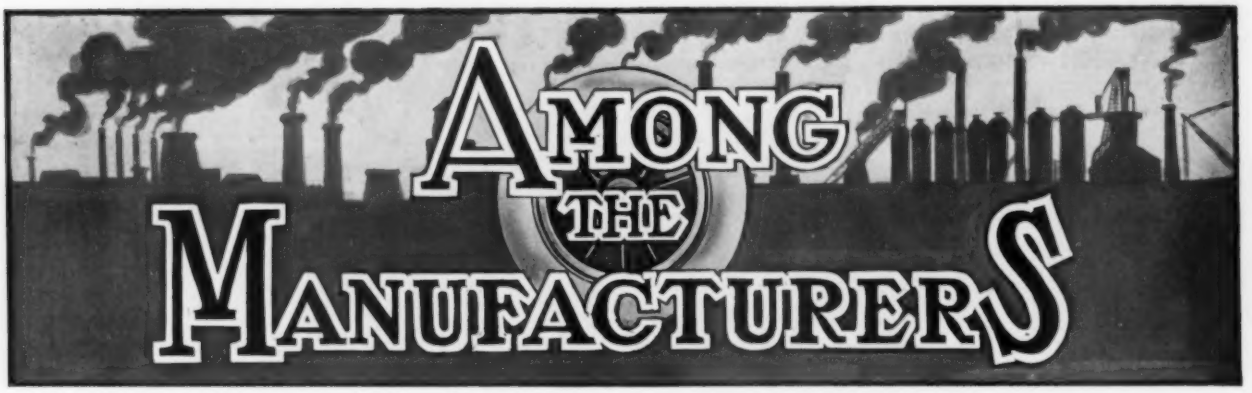
Table 2. Gear Ratio Requirements for Different Types of Cars

	Speed m.p.h	Engine or Motor Speed	Gear Ratio for 36 in. Wheels
Gasoline Vehicles			
Pleasure car.....	40	1200	3.2
1000 pound wagon..	20	1200	6.4
Five-ton truck.....	10	800	8.5
Electric Vehicles			
Pleasure car.....	20	2000	10.7
1000 pound wagon..	15	1400	10.1
Five-ton truck.....	7	1600	24.4

It will be seen that for conditions as indicated in this table and with limitations as fixed above, that the worm gear is not applicable to gasoline pleasure cars or heavy electric trucks, but that it can be legitimately used for all gasoline business wagons and trucks, for electric pleasure cars and light electric wagons.

CHAIN TROUBLES AND THEIR REMEDIES

The chief cause of the noise which sometimes comes from the chains of a chain driven car is wear on the teeth of the counter shaft sprockets. If the sprockets are small this wear takes place much more rapidly, as the number of teeth being less the pressure upon each is greater, and furthermore, in the case of those cars in which there is a greater difference in the speeds of the counter shafts and rear wheels, each tooth comes into use oftener within a given period. Because of the latter fact it is generally considered better practice to increase the ratio of the driving gears for the counter shaft, and thus run it at a speed more nearly approaching that of the rear wheels, than to get the necessary reduced speed at the road wheels by using comparatively small counter shaft sprockets and large ones on the wheels. Large diameter sprockets run smoothly and quieter and wear less than small ones. Furthermore, with small sprockets the movement in the wear on chain pivots is greater. The face of the teeth on a small noisy sprocket will be found more or less gouged out in concave form from the general wear and tear of the chain. When this gouging out becomes very marked every tooth becomes a form of hook, from which the chain links can only release themselves with great difficulty, instead of being able to roll off with perfect freedom. The actual result of this on the run of the chain is a violent tug at every enforced disengagement of a link from the sprocket. That there will be undue noise and vibration from the transmission almost goes without saying. The best remedy is to put on a new pair of sprockets; the next best is to have the old ones taken off, and the ends of the hooked teeth ground off on an emery wheel. In this case it is better not to put on new chains, as the old ones will conform better to the altered pitch of the sprockets. If new sprockets be fitted, then it is a good plan to put on new chains, so that the two exactly fit each other.



COLERIDGE, THE LATEST LOW-PRICED COMMERCIAL CAR

The Coleridge Commercial Car Company has been formed in Detroit, Mich., with a capital of $50,000 for the purpose of manufacturing a low priced delivery wagon. John C. Lodge is president of the new company, Ross Wilkins, vice-president; H. J. Underhill, secretary; R. B. Pomeroy, treasurer, and J. C. Coleridge, manager.

WESTMAN NOT GOING TO PAINESVILLE

The Westman Motor Truck Company, of Cleveland, O., is not going to locate in Painesville, as we announced in our last issue. Negotiations looking toward securing a site had progressed as far as making an initial payment, when they were broken off upon refusal of Painesville parties to extend the time for the final payment.

The company will probably remain in Cleveland.

DOWNS TRACTOR COMPANY TO BUILD CARS

The Downs Tractor Company, of St. Louis, Mo., a $2,000,000 concern, is about to begin the manufacture of a line of commercial cars, a feature of which is to be the gasoline-electric drive, such as is employed in the twenty-ton Omaska car designed by George H. Downs, president and chief engineer of the company, which is temporarily located in a four-story brick and concrete building at No. 1515 Pine Street, St. Louis, Mo. A factory is to be erected shortly and the concern is also to feature gas-electric pleasure cars. Former Mayor Geo. W. Allen, of St. Louis, Mo., is vice-president; George W. Manchester, secretary, and Walter G. Wallace, treasurer. The product will be known as "St. Louis Giant."

GRABOWSKY INCREASES CAPITAL

The Grabowsky Power Wagon Company, which recently moved into its new plant at Mt. Elliott avenue and Belt Line, Detroit, Mich., has increased its capital stock from $500,000 to $1,000,000, to take care of the rapidly growing business. Twenty per cent. of the new issue of $500,000 was in the nature of a stock dividend, $200,000 was held in reserve, and $200,000 placed on the open market at $10 per share, that being the par value, with no less than 10 shares sold to a single investor. It is expected that when the new capitalization is completed the output will be increased to 1,200 commercial cars a year.

TO MAKE COMMERCIAL CAR BODIES

The Detroit Carriage Company, of Detroit, Mich., well known to the trade as makers of automobile bodies, have started the manufacture of commercial car bodies.

ALDEN SAMPSON EXPANSION

A substantial addition to the Alden Sampson plant at Detroit, Mich., is planned for immediate erection, and when this is completed the company will have 200,000 sq. ft. of floor space, the present quarters being 1020 ft. in length, said to be the longest motor truck factory in the world.

NEW ELECTRIC COMMERCIAL CAR

The Bronx Electric Vehicle Company, which has established a factory at 294 East 135th Street, New York, intends to build a line of electric vehicles ranging from 100 to 8000 lbs. capacity. The chassis will carry all the running gear, etc., so that any style of body can be fitted.

NEWARK COMPANY GETTING BUSY

The Newark Automobile Manufacturing Company, of Newark, N. J., was recently capitalized at $500,000 under the laws of New Jersey. An option has been obtained on property in Irvington, on the Lehigh Valley Railroad, with a view to erecting a plant for the purpose of turning out commercial cars. Many new features will be incorporated in the Newark product, one of them being the Johnson transmission which has the same number of speeds forward as reverse, and has the unusual feature when throwing gears into mesh of putting the entire width and strength of the gears immediately, thus rendering stripping of the gears impossible.

In addition to the Johnson transmission, the Newark truck will be equipped with a 20-24 h. p. Newark motor of long stroke, constructed on special lines and of their own design. A straight line shaft drive is used with a gear reduction on high speed, giving a maximum of not more than twenty-five m. p. h. making it impossible for drivers to enter into racing contests.

THE CHICAGO COMMERCIAL CAR COMPANY, engaged in the production of gasoline friction driven light commercial cars, is located in temporary quarters at Wabash, Ind. It is said at the offices of the company in Chicago that in the very near future the company will remove to a factory near Chicago.

THE IDEAL AUTO COMPANY, of Fort Wayne, Ind., manufacturer of the "Ideal" commercial car, has recently moved into new quarters at 616-650 High Street.

THE LEWIS SPRING & AXLE COMPANY, of Jackson, Mich., is now erecting a new factory building especially to take care of commercial car business. It is expected this building will be completed about the end of July.

THE KENDLE MOTOR CAR COMPANY, of Philadelphia, Pa., is being formed by Howard Mitchell and J. F. Zane of Lansdale, for the purpose of building commercial and pleasure cars. Two acres of land have been purchased in North Lansdale.

W. H. HARRIS, of Indianapolis, interested in a motor truck, says Warren, Ohio, has subscribed the necessary money with a bonus of 45 acres of land for a factory, and that he will locate there. He will incorporate the Ohio Motor Truck Company.

THE LONG MANUFACTURING COMPANY, formerly located at 1430-38 Michigan Ave., Chicago, Ill., has moved to its new and modern factory at Detroit, Mich., where it has every improved and modern contrivance for the manufacture of automobile radiators and hoods. The new address is 1283-1315 Cass Ave., Detroit, Mich.

THE H. H. BABCOCK COMPANY, of Watertown, N. Y., is using its fifty years experience among horse drawn vehicles in producing a commercial car of 1500 lbs. capacity. Being familiar with the requirements of business service, the builders have endeavored to turn out a machine that will stand rough usage without interruption of service.

THE GARDNER ARTIFICIAL LUMBER COMPANY, of Barberton, Ohio, has installed machinery which will enable it to turn out its well-known composition lumber in sizes up to 6x16 feet, and from ¼ inch thick up. This increase was made necessary by the requirements of the commercial car trade, makers wishing to build bodies with top and side panels in one piece.

THE UNIVERSAL MOTOR COMPANY, formerly addressed at New Castle, Ind., has removed to Warren, Ohio, where it has licensed a subsidiary company known as the Ohio Universal Truck Company, to carry on the auto vehicle branch of the parent company's business. The Ohio Universal Truck Company, incorporated under the laws of Ohio, has secured thirty acres of land and plans for a modern factory of approximately 110,000 sq. ft. floor space are being developed by architects, with the expectation that manufacturing operations will begin about October 1, 1911.

COMMERCIAL CAR MAKES HARD TRIP IN WHITE MOUNTAINS

An exceptional trip of a light delivery truck was recently made in the White Mountain district, and incidentally produced a record of which it can justly be proud.

It was at 6.30 o'clock Sunday morning, June 18th, that a Buick truck with a load of 1,800 lbs. and carrying three passengers left Boston for Franconia.

From the first, conditions were unfavorable as a light rain made the roads slippery, but Lowell was reached in one hour and twenty-five minutes, and at 11.30 the truck pulled into Manchester, N. H., in the pouring rain. On the first 66-mile leg of the journey only four gallons of gasoline were consumed.

Because of the rain the day's trip ended at Manchester, but at 10 o'clock Monday morning, there being no signs of let-up in the drizzling rain then falling, the car started out again following the Merrimac River road.

At Salisbury, a little town above Concord, it was necessary to make a 15-mile detour on account of a small bridge being torn up. This side trip was made over a logging road which was just wide enough for the truck to get through and the sand and mud for most of the distance was anywhere from 6 to 15 in. deep, and at times the grades averaged considerably over 20 per cent. On one of these hills the rear axle was buried in sand, but under its own power the car pulled through to the main road and from there to Plymouth the going was fine.

From Plymouth to North Woodstock the roads were being repaired and in some places would have been almost impassable even in dry weather, but in the rain they would have taxed the ability of the highest power touring car, and the fact that the Buick truck, with its heavy load pulled through with ease is greatly to its credit.

From North Woodstock to Franconia Notch it is a steady rise of four miles, which is not only very steep, but which is made more difficult to negotiate on account of the water breaks which cross the road at short intervals.

At 10.30 Monday evening the party arrived at the Forest Hills Hotel, after having covered 215 miles with practically every mile of the distance through pouring rain and with no trouble of any nature whatsoever.

The actual running time was 15 hours and an average of over 10 miles to a gallon of gasoline were made, the total consumption of gasoline used in covering 215 miles being twenty-one gallons.

The performance of the truck under such adverse circumstances is remarkable. Those who accompanied the car say that in spite of the disagreeable rain it was an experience that was well worth while. The last two miles of the journey were particularly interesting, as a portion of the time the party was above the clouds where the stars were shining and would drop down a hill into a heavy rain.

G. O. MILLER, a merchant of White Rock, Minn., has started auto truck delivery between Red Wing and that township. Mr. Miller drove his conveyance, loaded with barley, from White Rock to the elevators of the Red Wing Malting Company, a distance of fifteen miles, in one hour and thirty-five minutes. Receiving the check for the grain, Mr. Miller, after loading a ton of flour and some merchandise on the truck, departed for home. Had the hauls been made by team as usual, the greater part of the day would have been consumed in completing the trip.

Commercial Car Converts

Emil Keppler, of Patapsco Neck, Md., now owns a Buick delivery car.

Leslie Curtis, of Dexter, Me., has purchased a 22 h. p. commercial car.

Wright Kay, of Detroit, Mich., has in service a 1000 lb. Detroit electric.

George Turner, of Providence, R. I., now owns a 20 h. p. International truck.

M. J. Doran, a bottler of Meriden, Conn., has purchased a 1500 lb. Atterbury.

The Altoona Brewery, of Altoona, Pa., has received a Reo commercial car.

The Eagle Brewing Company, of Utica, N. Y., has purchased a three-ton Hewitt.

The Jordan Stabler Company, of Baltimore, Md., now owns a 1½ ton White truck.

Harry T. Scott, of Newport, R. I., has purchased a 20 h. p. Rambler delivery car.

Deere & Company, of Moline, Ill., has purchased a three-ton 40 h. p. commercial car.

Otto H. Meyer, of St. Joseph, Mo., has purchased a Hupmobile commercial car.

Urken and Kohn, of Trenton, N. J., have purchased an 800 lb. Ford commercial car.

C. and A. Mander, brewers, of Elmira, N. Y., have purchased a Reo commercial car.

Kobacker's, the home outfitters of Flint, Mich., have purchased a Cass commercial car.

Vestal and Hubbell, feed merchants of Petaluma, Cal., have purchased a 3½ ton Kelly.

David Wallace & Sons, of Detroit, Mich., have purchased two one-ton Detroit electrics.

The Chardlèy Company, of Worcester, Mass., has purchased a 1½ ton commercial car.

The Laird Lumber Company, of Ashtabula, O., has purchased a three-ton commercial car.

C. P. Ring, of St. Paul, Minn., has purchased an International Harvester commercial car.

Alphonse Desrochers, of Providence, R. I., has added an 18 h. p. truck to his equipment.

The White Hardware Company, of Wilkes-Barre, Pa., has just received a one-ton Hewitt.

Hick Brothers, of Attleboro, Mass., have purchased a commercial car for delivery purposes.

Janney-Semple-Hill & Company, of Minneapolis, Minn., have purchased a Reo commercial car.

The William Segar Company, of Westerly, R. I., has purchased a 9 h. p. Reo commercial car.

Burnham Stoepel, of Detroit, Mich., has purchased two 1½ ton Detroit electric commercial cars.

Newcomb & Endicott, of Detroit, Mich., have purchased three Detroit electric commercial cars.

The National Brewing Company, of Syracuse, N. Y., has purchased a three-ton commercial car.

Roshek Brothers, of Dubuque, Ia., have a commercial car for department store delivery purposes.

The Gruell and Ott Bottling Works, of Port Huron, Mich., has received a Cass commercial car.

The United Electric Company, of Oakland, Cal., has purchased a 1½ ton electric commercial car.

The R. M. Chapman Bastury Company, of Minneapolis, Minn., has purchased a Reo commercial car.

The Standard Brewing Company, of New Orleans, La., is a user of three-ton Hewitts for brewery work.

Bert Davis, of Worcester, Mass., has purchased a Rapid commercial car for use in his trucking business.

The Forest Hills Hotel, of Franconia, N. H., is using a 1500 lb. Buick commercial car to haul luggage.

L. L. Gilbert, of Detroit, Mich., has installed two one-ton Detroit electric commercial cars in service.

R. C. Reynolds, of Troy, N. Y., has placed an electric commercial car in service for delivery purposes.

Thonet Brothers, of New York City, have started their commercial equipment with a two-ton Hewitt.

Frank G. Smith, of Ashland, N. H., has purchased a Reo light commercial car, the first in that town.

C. W. Young, of Elmira, N. Y., has invested in an International Harvester for use in his store business.

Scott and Jones, of Youngstown, O., in future will deliver pianos by means of a White commercial car.

The People's Store, of Fort Wayne, Ind., has installed a Whitesides commercial car in its delivery service.

Hedges and Buck, a wholesale grocery house of Stockton, Cal., has purchased a one-ton Detroit electric.

The George C. Engel Company, meat dealers in New York City, have placed a two-ton Hewitt in service.

Eiler's Music House, of Portland, Ore., is using a Warren commercial car for use in delivering pianos.

The Scudder Gale Grocery Company, of St. Louis, Mo., has purchased a three-ton Alco to replace three teams.

The Wilson and Adams Company, of Mt. Vernon, N. Y., is using a removable stake body for hauling lumber.

The Farley and Loetscher Company, of Dubuque, Ia., has purchased a three-ton truck for delivering mill work.

The Moline Heating and Construction Company, of Moline, Ill., now has a Velie 40 h. p. 1½ ton commercial car.

T. Briggs & Company, of Elmira, N. Y., have recently acquired a Reo commercial car for city delivery purposes.

The Charles M. Stieff Piano Company, of Baltimore, Md., has equipped its delivery department with a White truck.

The Lion Brewery, of New York City, has purchased a number of three and seven-ton Hewitts for its bottling plant.

The Pearl Mills, of Lansing, Mich., are using a Reo commercial car to perform work formerly done by three horses.

The New England Brewing Company, of Hartford, Conn., has purchased a three-ton Alden Sampson commercial car.

The Ward Corby Company, of Cambridge, Mass., has received a specially designed Mack truck with an extra large body.

Edward J. Albright, of Roland Park, Md., an expressman, has purchased a one-ton Grabowsky truck for use in his business.

THE F. H. MILLER COMPANY, of East Providence, R. I., has added a 16 h. p. Martin commercial car to its delivery service.

M. B. EISENBREY, of Aldan, Delaware County, Pa., has purchased a high wheeled motor buggy for use in his grocery business.

THE PORT HURON CREAMERY COMPANY, of Port Huron, Mich., is now using a Cass commercial car for hauling milk and cream.

THE L. A. CORNING ICE CREAM COMPANY, of Elmira, N. Y., now owns a Reo commercial car for use in delivering ice cream.

THE BAKER IRON WORKS, of Los Angeles, Cal., has purchased a three-ton commercial car for use in hauling structural steel.

LOUIS SAUNDERS, a caterer of Gloucester, Mass., has taken a commercial car to enable him to take care of his delivery department.

THE UNION WELL SUPPLY COMPANY, of Los Angeles, Cal., has installed a one-ton Randolph in its local trade delivery system.

THE HOLLISTERVILLE CREAMERY COMPANY, of Hollisterville, Pa., now uses a one-half-ton Chase to take the place of thirteen horses.

THE C. & W. TRANSFER COMPANY, of Los Angeles, Cal., has purchased a one-ton Grabowsky commercial car for use in hauling pianos.

THE VELVET ICE CREAM COMPANY, of Elmira, N. Y., has purchased an International Harvester commercial car for suburban delivery.

THE PUTNAM FURNITURE COMPANY, of New London, Conn., recently put into commission its new commercial car for delivery purposes.

THE ABELE BOTTLING WORKS, of Peekskill, N. Y., has purchased a one-ton Hewitt for use in distributing bottled goods in that vicinity.

THE PROVIDENCE AND WOONSOCKET MOTOR TRUCKING COMPANY, of Providence, R. I., has purchased a 32 h. p. commercial delivery car.

HENRY J. PERKINS, of Springfield, Mass., has purchased a commercial car for use in the fruit business, being the second one that he has bought.

THE MILLER-TOMLINSON COMPANY, of Portland, Me., has placed in service a Garford commercial car to be used in its wholesale provision business.

THE WESTERN TRUCK COMPANY, of Tacoma, Wash., now employs a three-ton Gramm to do the work that formerly required three large horse teams.

THE PEOPLES' CLEANING AND DYE WORKS, of Wichita, Kan., is now using a Reo enclosed body commercial car for soliciting out of town business.

THE HOCHSCHILD, KOHN COMPANY, of Baltimore, Md., is a recent purchaser of two 1500 lb. White commercial cars for use in its delivery department.

THE CORVALLIS CREAMERY, of Portland, Ore., has purchased a Reo commercial car, being the second machine of the same make that they are using.

THE BROOKLYN TIMES has decided to gradually replace its horse teams with commercial cars, and to that end has placed in service a 1500 lb. White.

COLGATE AND COMPANY, the well-known soap manufacturers of New York City, have recently added two one-ton Hewitts to their already large fleet.

THE T. H. LAVENBURG CIGAR COMPANY, of Wichita, Kan., has purchased a Reo enclosed body commercial car for use in soliciting out of town business.

J. CH. HUBER, a bottler of beers and beverages in Bayonne, N. J., has just put into service a one-ton Hewitt for distributing bottled beer in northern New Jersey.

WILLIAM YARRINGER, of Ovid, Mich., a recent purchaser of a Cass commercial car, says that the machine does the work of six horses. He uses it for moving his berry crop.

THE SISSON BROTHERS-WELDEN COMPANY, of Binghamton, N. Y., has purchased a Warren-Detroit delivery car for use in its dry goods business. The car has a capacity of 1000 lbs.

IVINS AND TAYLOR, undertakers, of Trenton, N. J., have purchased a commercial car for use in their business. The chassis is a Thomas 60 h. p., and the body was built to designs by the owners.

PALMER BROTHERS, of Fitchville, Conn., have secured a commercial car for use in connection with their quilt mills. The truck will carry cloth and quilts between the three mills of the company.

THE ELDER AND JOHNSTON COMPANY, of Dayton, O., has placed in service three 1000 lb. electric commercial cars and two of smaller capacity. The batteries will be charged by the company's plant.

THE HOME TELEPHONE COMPANY, of Detroit, Mich., has purchased four 1000 lb. Sampson commercial cars for use about the city of Detroit. The company has been using commercial cars for some time.

HOVELL AND KING, brewers, of Scranton, Pa., have placed a 30 h. p. commercial car in service on a regular route between Pittston and Scranton. The car carries twenty-five barrels of beer and makes two trips daily.

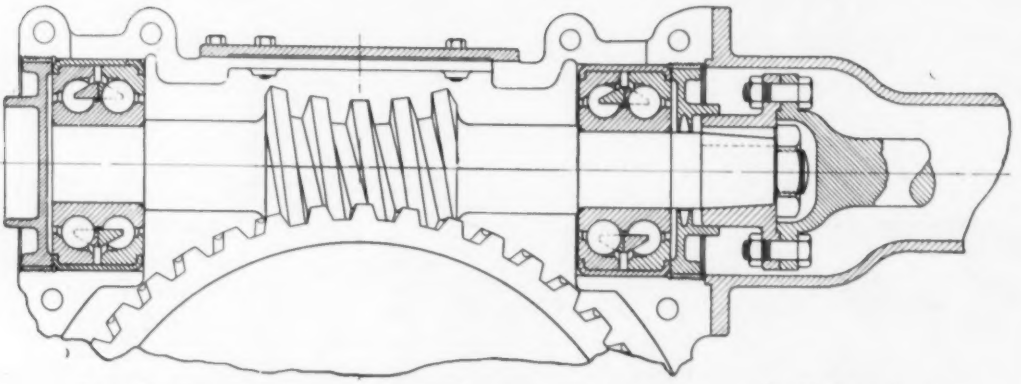
THE L. J. REYNOLDS TRUCKING COMPANY, of Norwalk, Conn., has recently added a Reo commercial car to its force of express wagons. The new machine is used for light trucking and does very efficient service. This is Mr. Reynold's first change from horses in his business.

THE R. T. FORD COMPANY, of Rochester, N. Y., is using three three-ton commercial cars equipped with dump bodies, in its work on the New York State education buildings at Albany. They load with a steam shovel, and they estimate that each truck does the work of eight teams.

THE LOOSE-WILES BISCUIT COMPANY, Kansas City, Mo., has recently acquired a commercial car which put out of commission eight horses. Their route extends over thirty miles, distributing to 130 groceries, and the truck covers it in four hours. Previously four two-horse wagons were required to do the work.

THE LOUISVILLE LIGHTING COMPANY, of Louisville, Ky., has replaced its horse-drawn wire wagon with a 50 H. P. truck, which is equipped with a 30-foot extension ladder and other necessary equipment. The machine will carry four men and will be used chiefly for use during a fire. The purchase price was $3,500.

NEW DEPARTURE
Ball Bearings



Simple mounting of New Departure double row ball bearing in worm drive mechanism.

The Logical Bearing for Worm Gears

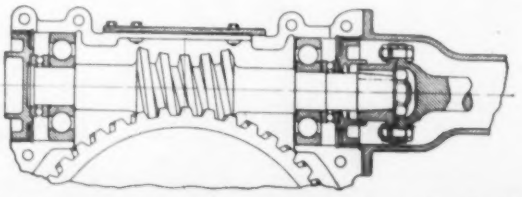
The New Departure double row ball bearing is particularly well adapted for efficiency in worm gear mechanism. Here, the thrust loads are unusually severe, often equaling the radial strains. The New Departure bearing resists both the radial and thrust stresses simultaneously, if necessary, and without friction.

It maintains the absolute alignment that is essential.

Besides being superior in efficiency, it is also economically mounted because of the few parts to assemble, the minimum machining necessary and no possibility of error in installing.

This bearing cares for the severe service conditions in worm gear mechanism even more effectually than will any combination of single row and thrust bearings and offers, besides, other important advantages. Note the comparative mountings illustrated on this page.

You can have our descriptive catalogue and the co-operative service of our engineering department, for the asking.



Complicated mounting of combination of single row and thrust ball bearings in worm gear mechanism.

The New Departure Mfg. Co., Bristol, Conn.

Western Branch Office, Room 1016-17 Ford Bldg., Detroit

A Truck Proved Right by Severest Punishment

The Federal One-Ton Truck—Chassis, Including Seat, $2100. Body type at purchaser's option.

Wheelbase, 110 inches. Weight, 3200 pounds. Horsepower, 30; four cylinders. Radiator, vertical tube suspended on springs. Bosch high tension magneto. Clutch, 16-inch cone, leather-faced, selective, three speed forward and reverse transmission. Timken bearings in wheels. 36-inch wheels front and rear. Pressed steel 7-32 inch frame. 12 x 1½ inch brakes on jack shaft, 16 x 2½ inches on rear wheels. 19 tooth front sprocket, 46 tooth rear.

FEDERAL ONE TON TRUCK

In the construction of the Federal truck the usual process is reversed.

It has been quite a common practice in the past to experiment at the customer's expense.

The Federal Motor Truck Company has made haste slowly, by devoting 18 months to development and demonstration.

The Federal in its perfected form represents a truck which has been subjected to every sort of use and abuse which it could possibly encounter.

It has been required, over and over again, week after week, and month after month, to carry excess loads, over roads of every sort through sand and mud and snow.

It has been put through the paces in the hilly cities of the West Coast, over the miles of New York streets, and in a score of inland cities.

Every conceivable condition of going and of load has been encountered by the Federal in its rigorous try-out.

We present it to you today as a truck that has been proven by the severest sort of punishment.

Of its type and size we believe it to be the strongest truck in the world.

No matter how inexperienced you may be in truck construction, a glance at the chassis will show you that every possible essential part is made with amazing stoutness.

Every part, too, is within reach of the caretaker's hand. It can be kept constantly in tune by anyone possessing the slightest knowledge of mechanics.

Instead of being over-rated as to power and capacity, it is under-rated.

We sell it to you as a one-ton truck. But it is guaranteed to carry a ton and a half load without a particle of overstrain.

We can easily prove all we have said, if there is a Federal representative in your vicinity, by having a practical demonstration of the truck in your own business.

You at least should write for further information about a truck so remarkable as this is.

We want established, responsible automobile dealers in a number of cities as Federal sales representatives; but we will consider only the applications of those who are prepared to give the proper kind of service to Federal owners. If you are in a position to do this, write us,

FEDERAL MOTOR TRUCK COMPANY, 102 Isabella St., Detroit, Mich.

SALES REPRESENTATIVES

New York City
Motors Engineering & Sales Co.
250 West 54th St.

Boston, Mass.
Whitten-Gilmore Company
709 Boylston St.

Philadelphia, Pa.
Fischer Motor Car Company
311 No. 11th St.

St. Louis, Mo.
Whitman Motor Car Company
6900 S. Broadway

Detroit, Mich
Thompson Auto Sales Company

Kansas City, Mo.
Mutual Auto Company
2121 Harrison St.

San Francisco, Cal.
Standard Motor Car Company

Los Angeles, Cal.
Standard Motor Car Company

Portland, Oregon
Stoddard-Dayton Auto Co.

Des Moines, Iowa
Brown, Corley, Ellis Co.

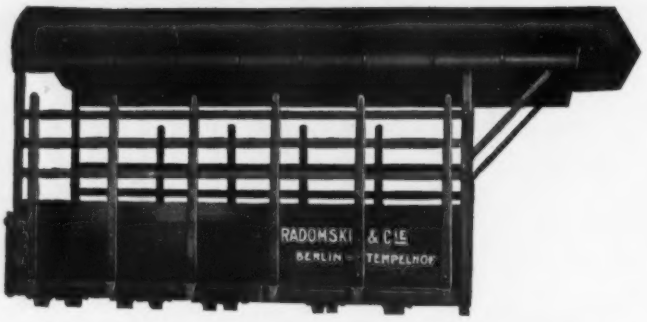
Toledo, Ohio
Atwood Automobile Company

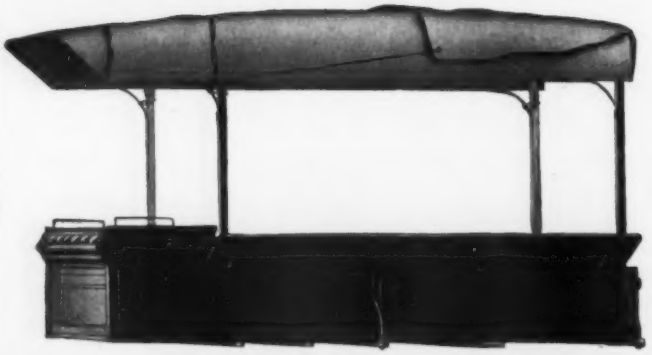
Camden, N. J.
The E. M. F. Company

Lynn, Mass.
C. E. Whitten
49 Central Ave.

McIntyre

Commercial Power Wagons





Special bodies for every purpose.

Dealers handling the McIntyre line are the leading dealers in their communities:

Because—

The McIntyre line is complete.

The price is right.

One sale produces other sales.

It is built on honor.

The Heavy Duty Motor has an automatic governor, which absolutely prevents overspeeding—the source of 90% of all truck troubles.

The owner, not the driver, controls the speed.

It is built for service.

The McIntyre advertising campaign in the newspapers promotes business for the dealers.

The McIntyre advertising campaign is the greatest newspaper publicity campaign ever applied to the exploitation of a commercial power wagon.

W. H. McIntyre Co.
AUBURN INDIANA

McIntyre

Commercial Power Wagons

have proven their adaptability to every commercial need. They are making good everywhere, and quality and price considered they are absolutely without a rival.

Note these specifications:

Model "XIV"—Guaranteed capacity 2000 lbs.

Tires: 2½", solid rubber, or at an expense of $50.00 extra, 3" in front and 3½" in the rear.

Motor: 24 H.P., two-cylinder, bore 5¼".

Stroke: 4¾". Water-cooled.

Transmission: Planetary, or at an extra charge of $150.00, sliding gear with three speeds forward and one reverse.

Ignition: Dual system, Magneto and Dry cells.

Price of Chassis, $1300

Model "XXI"—Guaranteed capacity 3000 lbs.

Tires: 3" solid rubber in front, 3½" in the rear.

Motor: 35 H. P., 4 cylinders, water-cooled, 4¼" bore, 4½" stroke.

Transmission: Planetary, or at an expense of $150.00, sliding gear with three speeds forward and one reverse.

Ignition: Dual system, Magneto and Dry cells.

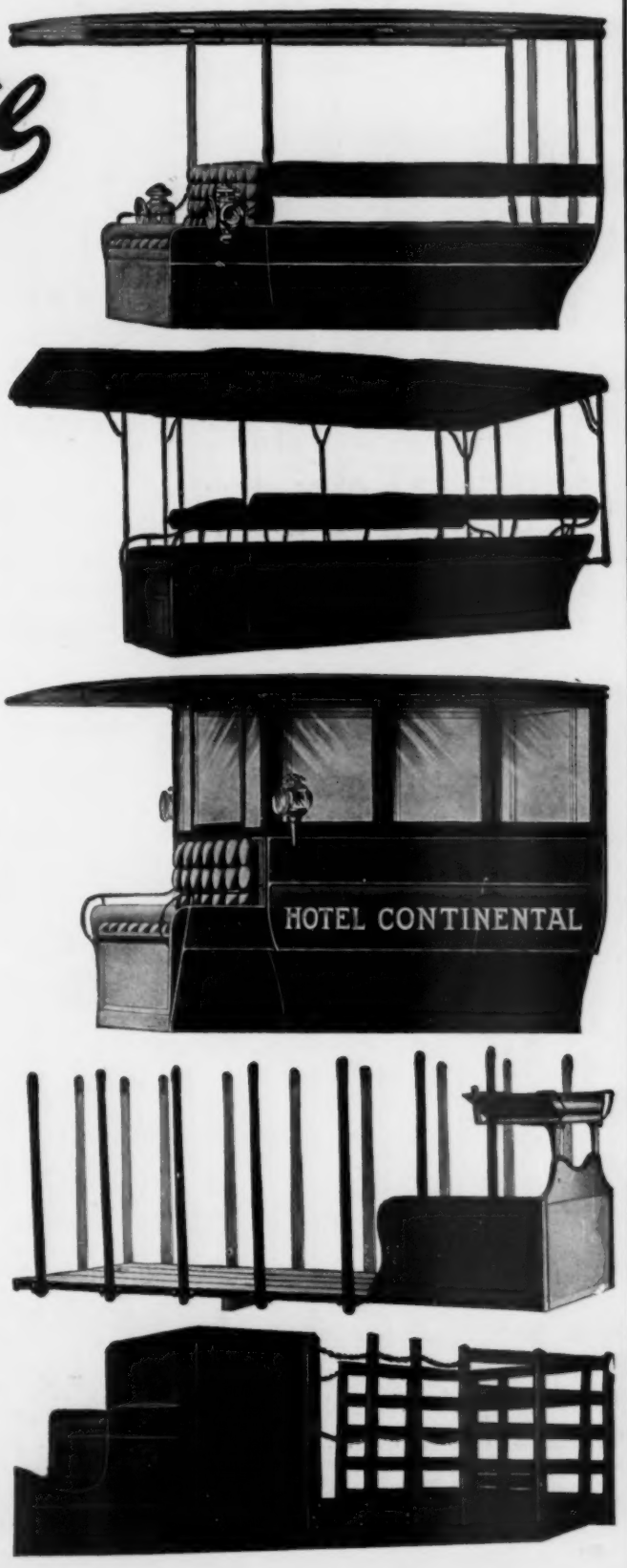
Price of Chassis, $1600

We can furnish any kind of body required at lowest prices.

Send for particulars regarding the complete McIntyre line; also for information regarding our newspaper campaign conducted over the dealer's own name in the dealer's own city.

W. H. McIntyre Co.

AUBURN INDIANA



Think of the truck ten years from now.

YOU will realize your need for a motor-truck some day. But before you decide which make you will buy, think what condition that truck will be in after ten years of hard service.

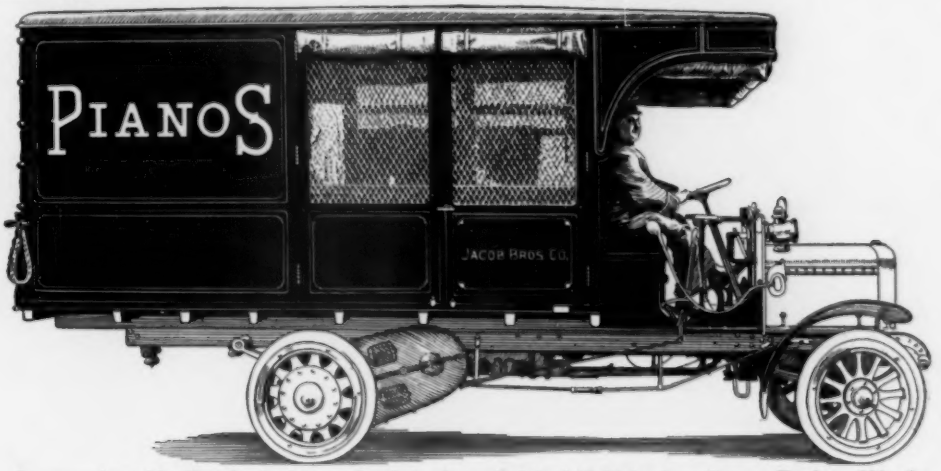
Think over it well because the worth of any truck must rest largely on how rapid is its depreciation.

Insist that motor-truck makers show you records. Not one or two, but a good number covering a sufficient period of testing.

The Commer Truck can show an unusual number of remarkable records. In reality we cannot tell how long a Commer Truck will last because not one has ever worn out. Every one of the first lot of Commer Trucks made seven years ago remains in successful service to-day. A good number have covered over 200,000 miles.

Judging from the average condition of the many seven-year-old Commer Trucks we have seen, we believe the life of a Commer is indefinite provided the maintenance is continued in an efficient manner. We can give you good proof on which we base this belief.

While the Commer Truck may be the most costly, it is far from being the most expensive. We know it is the most economical high-duty motor-truck when considered as an investment expected to bring consistent returns for years to come.



In a recent letter, Mr. Chas. Jacob advises us that during the week of April 17-22 the above Commer Truck ran 290 miles on 35 gallons of gasoline *or about 8.3 miles to the gallon.*

The Commer Truck

2½-TON **3½-TON** **4½-TON** **6½-TON**

It took us two years to make up our minds that the Commer Truck was the best high-duty motor-truck in the World's market.

During those two years we were in the same position you are in—we were buying, not selling. We brought all our ten years of experience in automobiles to bear in making the selection right. We scrutinized records and mechanisms with the greatest care for the very good reason that we could take no chance of jeopardizing our established reputation and yearly business of $2,000,000.

For nine whole months before our final decision to take the Commer, we put a 3 1-2 ton model through the most racking tests we could think of. During those nine months of severe daily testing the repair expense was absolutely nothing.

On the books of the parent plant in Luten, England, there is not one concern that has ever changed to any other truck since their first purchase of a Commer. Motor-truck buying is too businesslike a proposition to enable us to make such a record unless the Commer Truck gave most positive worth.

If you are considering or buying motor-trucks and basing your decision on a ten-years-from-now viewpoint, we can give you a concrete idea of what a Commer Truck will save you. We will gladly back this by an actual demonstration.

We will do no theorizing, no generalizing. We ask you to get in touch with us because we shall confine ourselves strictly to facts which will concern you—not us. Address our Department B.

WYCKOFF, CHURCH & PARTRIDGE, INC

BROADWAY AT 56TH STREET, NEW YORK **The Most Complete Motor Service in America**

We shall be pleased to negotiate for the Commer Truck agency with dealers in other large cities